

American Forestry

SEPTEMBER

1911

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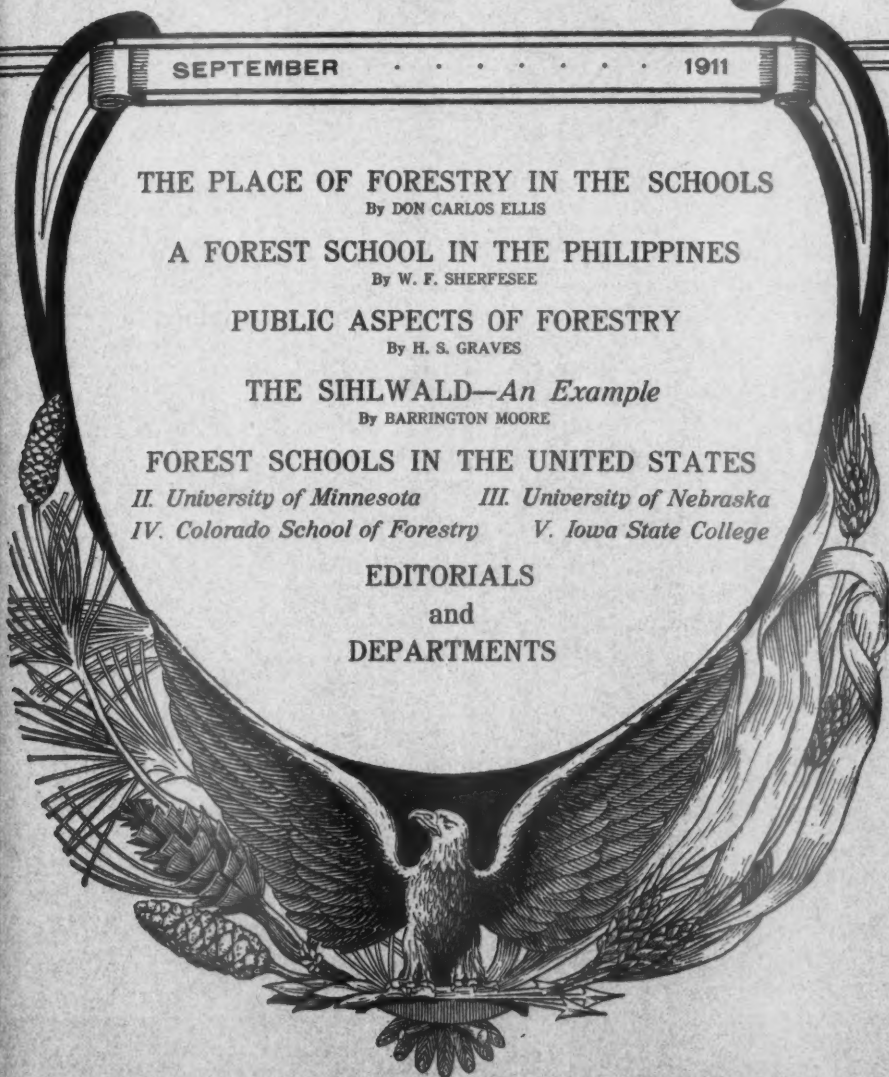
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American Forestry

VOL. XVII

SEPTEMBER, 1911

No. 9

THE PLACE OF FORESTRY IN THE SCHOOL

BY DON CARLOS ELLIS

UNITED STATES FOREST SERVICE

THE ideal school is an ever-changing institution, which is constantly adjusting itself to its ever-changing needs. With the modifications taking place in our political, economic, and social life and the development of science, modern education must also change or fail in its mission. We have passed beyond the period when education was for culture alone. Education for efficiency is the battle cry today; and it is required that the school, besides training the mind of the pupil, give him instruction in those problems which he is to face in his later endeavors. To accomplish this the work of the school must be correlated with the activities of the world outside. Important among the scientific and economic developments of this century is the advance of the principles of conservation into national prominence. The progress made by this movement within the past few years has been without precedent. The importance of the conservation of natural resources had long been appreciated in the old world, and its principles applied. It is new to America, because the country itself is new and its resources only in the early stages of their depletion. Until very recently, our resources were valued only for their immediate exploitation, and no thought was given to the morrow. Today no economic problem is given more public attention.

The idea of conservation is the greatest constructive idea of the times. Although a new one in this country and of very rapid development, it has come to stay. There is a danger, however, as in all movements of unusually rapid growth, that it may lose much of its force unless adequate means are employed to crystalize and perpetuate the intense popular approval which this generation is giving it. One of the means to this end is legislation; but a far more important one is the school. Early impressions are the ones that persist. Principles inculcated in the formative period of youth become ingrained into the character and partake, in a way, of the very nature of a man. If we would have a child develop into a financier, it is best to direct his attentions early to the problems of finance; if we would have the man a farmer, it is safest to make him one when still a youth. And the same applies to the wider field of citizenship. If we expect to produce a good citizen, the principles underlying useful citizenship should be inculcated in the boy or girl; and if we would save our country from the folly of wastefulness and thriftlessness, the principles of thrift should be instilled into the new genera-

tion. You may print conservation in the press, declaim it from the rostrum, and preach it from the pulpit, but unless you teach it in the school, it must die with the generation that gives its birth. Conservation has become popular today largely because of the wonderful propaganda which has been waged in its favor. But a propaganda is of its nature ephemeral. It cannot last indefinitely; it cannot continue from generation to generation with the same fervor and the same efficiency that it shows at the climax of its early successes. It must either produce a permanent status or fail. The conservation propaganda, has impressed a permanent character on this generation, but it remains for the teachers of the land to decide how many generations it is to persist. Even our legislators have not this power, for though they may enact the soundest legislation, unless they have an educated public opinion to support it, it would be better that the laws had never been made.

Conservation, in this country as in most countries which have adopted any system of saving their resources, began with forest conservation, because the forests of a country are logically the first of its resources to become impoverished. A system for the preservation of the forests of the nation was being successfully applied long before its exponents thought of the wider activity. So, forest conservation was the forerunner of the whole conservation movement. Furthermore, the same practices which have been demonstrated as true and applicable in the case of the preservation of our woodlands have been found in a general way suited to all our other resources. The general principles of wise and economical use, elimination of waste, and provision for the future apply as well to minerals, soils, and waters, as to forests. This particular phase of the conservation work, forestry, has, therefore become a type of the rest, and in considering the general principles governing it, we come to understand the principles underlying all conservation. The preservation of the forests is intimately associated with the preservation of the land both within and without the forest, which it fertilizes and saves from erosion and floods, with the preservation of the minerals deposited beneath the hills; with water power and navigation the sources of whose regular supply it rules with our recreation grounds, which depend primarily for their beauty and healthfulness upon the forest; and with our game, which have their life in the woods, and our fish which swim in the waters arising in it. Then, too, of all our resources, the forest is in the most imminent danger of exhaustion, and next to soils is generally admitted to be the most important. Conservation deserves place in the schools; and the study of the forest and its preservation is a most practicable form in which to teach its principles, especially in the limited time which it is possible for most schools to give to it.

It is not only as a carrier for the study of general conservation, however, that forestry is valuable. Besides being highly cultural, it holds in itself a rich treasury of useful knowledge. Every citizen should understand the relation of the forest to the industries, the beauties, the health, and wealth of the nation. Such an understanding would make impossible the shameful waste of our forests which has been going on for so many years. A nation which understood its forests and their value would not countenance an annual loss by forest fires of fifty million dollars' worth of timber when that loss could be practically all prevented for an expenditure amounting to about one-fifth that loss, it would not stand idly by and see twice as much timber wasted as is used, it would not permit its woodlands to be so poorly managed that they grow only one-third the amount of timber that is being removed, when under proper management their growth could be twice doubled; it would not tolerate the spectacle which the last half century has witnessed, of the theft of millions of acres of valuable government timberland.



AN IDEAL SPOT IN WHICH TO STUDY THE RELATIONS OF THE FOREST TO STREAM FLOW



THE PLACE OF FORESTRY IN THE SCHOOL

AN UPTURNED TREE GIVES OPPORTUNITY TO STUDY THE ROOT STRUCTURE AND ITS OFFICE IN HOLDING THE SOIL IN PLACE



THE FOREST IS AS ATTRACTIVE IN WINTER
AS IN SUMMER



THE PLACE OF FORESTRY IN
THE SCHOOL

THE STUDY OF THE FOREST PUTS THE STUDENT
IN INTIMATE CONTACT WITH NATURE IN HER
MOST BEAUTIFUL FORMS

A separate course of forest study is not advocated, except in technical and agricultural schools; the curricula of our ordinary schools are already crowded. The subject should rather be taken up as part of courses already established, and it fits admirably and logically into many of them. American history, civics, and economics, physical and commercial geography, botany, manual training, nature study, and agriculture are in this day incomplete unless they give attention to the forests, their uses and influences, their exploitation, and the methods being advanced for their perpetuation and saner use. To begin with the elemental, the forest holds for nature study a wealth of material; the study of leaves and twigs, the identification of trees in winter and summer, the life of the tree and of the forest, and its influences upon the soils and waters and vegetable and animal life, all furnish sources of delightful study. Many of the most interesting lessons of botany can be learned from the trees. They present a great variety of plant life, and many botanical phenomena can be found nowhere else but in the forest. Then there is the further advantages that trees show many features of plant life on a large scale and that they are always accessible at all seasons of the year and are as full of interest in winter as in summer. Geology and geography, if they be adequately treated, must teach of the forest's influence upon land formation, soil fertility, the fixation and disintegration of sand, and the regularity of stream flow. Industrial and commercial geography should include a consideration of lumbering and of the many other wood-using industries which form so large a bulk of the country's business. Our forest areas, besides their direct control of lumbering, the fourth greatest of the country's industries, of the pulpwood and cooperage stock manufacturing and of the other wood-using industries and the influence which their supply of wood exerts directly or indirectly upon the innumerable other great commercial pursuits, affect also every industry which depends upon a regular supply of water, equable climate and fertile soils upon the slopes. The influences which the forests have had upon our civilization, first as an obstacle to be overcome, then as a prominent asset in the development of our wealth, and today as the most important factor in the conservation movement give them a definite place in the history and economics of the country. The need of a knowledge of woods in wood-working courses scarcely requires mention, and as for the place of forestry in agricultural studies, it is a decadent and obsolete form of the science of agriculture which excludes it. Forestry bears an intimate relation to agriculture and no agricultural course is complete unless it treats of the place of the woodlot in its relation to the farm, its value in supplying wood for farm uses and even for the market, its usefulness as a shelterbelt to the crops, the stock, and the dwellings, its ability to grow on tracts of land not suited to other farm crops and the problems of its care and management.*

The acknowledged tendency in the schools today is toward a judicious combination of theory and practice, toward the concrete and away from the abstract, toward investigation of original material rather than of reproductions and representations, and parallel with this tendency is an effort to get the pupils more into the open air and into field work. The study of the forest and of forestry as it is being generally presented for the consideration of teachers admirably satisfies both of these tendencies. It is essentially an out-of-door subject, it brings the student right into the woods and fields; it puts him in intimate contact with real things in nature, where he can study at first hand, and it makes him familiar with nature in her most beautiful

*Outlines of the study of forestry for different courses can be found in Forest Service circular 130, "Forestry in the Public Schools," which may be obtained from the U. S. Department of Agriculture, Washington, D. C.

forms. In this subject nature freely unfolds many of her charms. The forest is filled with interesting and wonderful things at every season of the year. It may be visited in winter as well as summer, and when in winter garb it reveals many secrets that are hidden during the other months. Even for class-room and laboratory work, the forest furnishes a wealth of material. It may be dissected and brought piecemeal to the very desks of the pupils and to decorate the walls of the class room. Studies capable of illustration with such easily obtainable and such tangible material have a great advantage over other studies, in that the child mind can reach the abstract only through things which appeal directly to his senses.

As an adaption of the school garden, which has of late become very popular and justly so, comes the school forest nursery, where trees can be grown from seeds of cuttings, and the seedlings used for school plantations, for roadside planting, for the beautification of home yards, and the like. Not only would those nurseries give many practical lessons in tree growing and planting and inculcate a lasting love of trees and an appreciation of their benefits, lessons which could probably not be impressed so permanently in any other way, but they would possess the advantage over the school garden that they could sustain the child's interest in the same individual plants during his whole course, since there would not be the yearly maturing of the crop as is the case in the garden.*

What is perhaps the most forceful argument has been left to the last. It is the vigorous indorsement which has been given by teachers themselves to the introduction of this study. Recently the Forest Service of the United States Department of Agriculture made a census of state, county, and city superintendencies and normal schools in which the subject of the forest was taught in any form. Seven hundred and fifty-one superintendents reported that the subject was taught in at least some of the schools under their supervision, while four hundred and sixty-one indicated their willingness to consider its introduction. Of the normal schools, out of two hundred and twenty-one which replied, one hundred and thirty-nine reported that forestry or tree study was one of the branches taught and forty-seven indicated a desire to introduce it. The forest study pursued in those schools ranged in all degrees from the simplest forms of the study included incidentally in nature study or botany to well developed courses of the science. In some superintendencies the subject was taught in all the schools, in others only a few schools in each had introduced it. The reports from the normal schools were the most gratifying, not only in the relative number of schools which were teaching the subject, but in the excellence and completeness of many of the courses. The greatest obstacles to the widespread introduction of forestry in the schools has been the lack of the requisite knowledge on the part of the teachers. It is particularly auspicious, therefore, that the subject is being so well established in the normal schools. The summer training schools for teachers at some of the universities, notably The Summer School of the South, at the University of Tennessee, have also taken up the work. The tendency is significant. Up to a few years ago, the study of the forest was scarcely known outside of a few technical schools and even simple tree study occupied but a very minor place. It is now receiving the consideration of the educators of the entire country and is gaining for itself a position in the school commensurate with its importance to the nation.

*Complete directions for establishing and maintaining a school nursery are given in Farmers' Bulletin 423, "Forest Nurseries for Schools," which may be had free from the U. S. Department of Agriculture, Washington, D. C.



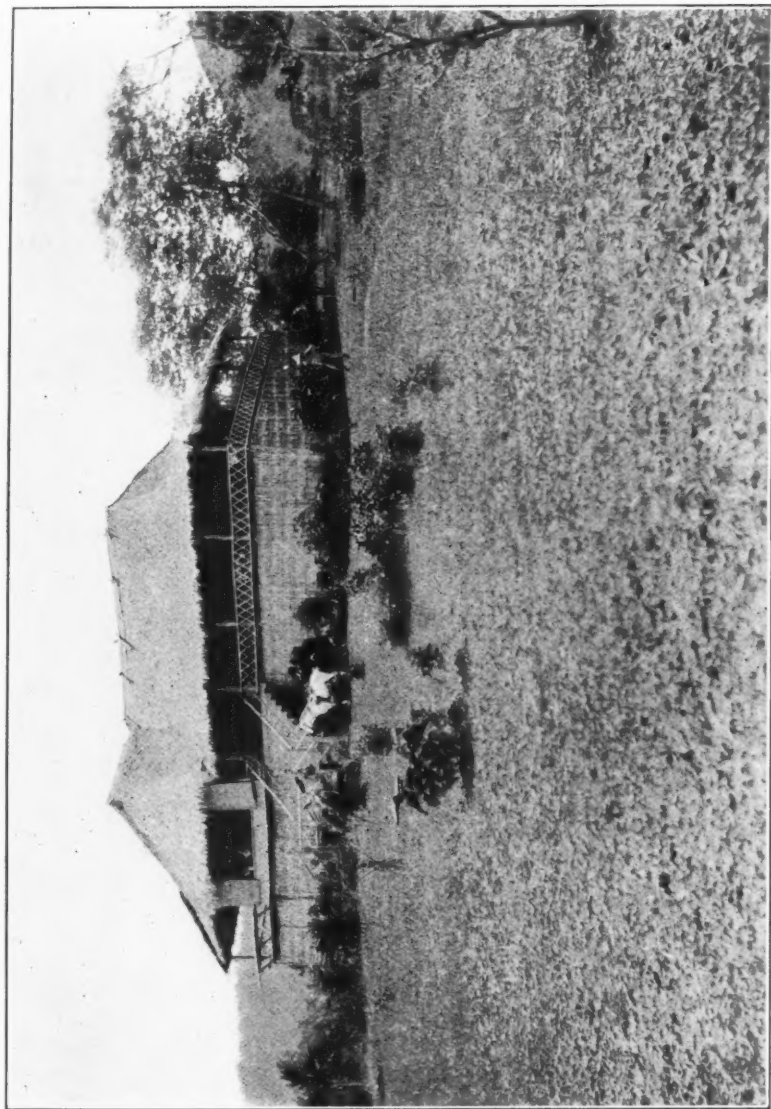
EXCELLENT OPPORTUNITY IS
AFFORDED FOR FIELD WORK



29114

THE PLACE OF FORESTRY IN THE
SCHOOL

A PLANTATION OF TREES IN A SCHOOL
YARD IN JOLIET, ILLINOIS, RAISED
IN THE SCHOOL NURSERY



THE BROAD VERANDAS OF FORESTER'S HOUSE
COMMAND AN UNINTERRUPTED PANORAMA
OF PALM-GIRT PLAIN, LAKE AND MOUNTAIN

A FOREST SCHOOL IN THE PHILIPPINES

A FOREST SCHOOL IN THE PHILIPPINES

By W. F. SHERFESEE

IN JUNE, 1910, scarcely more than a year ago, was opened the first school of forestry ever established in the Philippine Islands. For several years the necessity of such an institution had been making itself more and more strongly felt. The virgin forests of the islands cover some forty thousand square miles—one of the finest bodies of hardwood timber in the world—and in addition there are some twenty thousand square miles of second growth forests. Much of the timber does not lie in easily accessible, compact bodies, but is scattered over more than three thousand islands, most of which are mountainous and some are exceedingly rugged. The number of dialects spoken by the inhabitants is variously estimated at from thirty to eighty so that even an accomplished linguist can hope to become acquainted with only a discouragingly small percentage. There is no common language, for English is still the accomplishment of the schoolboy and the government employee, and Spanish was and remains the possession principally of the *illustrados*, or educated classes. In the early days the Filipinos were hostile to the agents of the new régime, and although at present most of the archipelago is as peaceful as a rural American village, the other difficulties suffice to render the efficient patrolling and protection of the public forests by no means a simple task. The right sort of Americans are hard to get; their service is expensive and they are unfamiliar with the country, its languages and customs. Hence they are employed in the Bureau of Forestry only in administrative and scientific capacities, and the actual work in the field must be entrusted to the Filipinos.

An untrained Filipino is at least no better than an untrained American, but fortunately the brighter ones are quick to learn and, after a fair amount of training, develop into excellent guards and rangers. A thorough familiarity with the topography, languages and customs of the country and people gives them an enormous advantage over strangers, and even if Americans could be secured in sufficient numbers, these advantages possessed by the Filipinos would make their employment preferable. Aside from these considerations it is also the fixed policy of the American administration in the islands to employ Filipinos for all positions which they are capable of filling. The chief difficulty hitherto has been that the demand for Filipinos in the Government service has far exceeded the number of applicants who have sufficient education to discharge the duties incumbent upon them; and just as in the United States it was necessary to train up foresters from the beginning to carry on the work of administering the timber lands of the government, so the Philippine Bureau of Forestry found itself seriously handicapped in the discharge of its duties because of the lack of an efficiently trained native force.

At first the founding of a regular forest school was impossible; sufficient funds were lacking and the scanty force of Americans in the bureau was too much taken up by administrative duties to permit them to do more towards educating the Filipino rangers than by such instruction as could be given in the field during the discharge of ordinary forest duties. Gradually, however, a

certain number of Filipinos, educated either in the United States or by close contact with American foresters in the Philippines for several years, had developed sufficiently to permit them to be placed in positions of responsibility hitherto occupied only by Americans. In addition the force of American foresters in the bureau was somewhat enlarged.

These conditions, then, permitted Major George P. Ahern, the Director of Forestry, to carry out his long-cherished scheme of founding a forest school for the training of head rangers and possibly later on of technical foresters. In the session of the Second Philippine Assembly held early in the spring of 1910, he secured the passage of a bill which permitted him to establish a Forest School in connection with the College of Agriculture of the University of the Philippines and to appoint twenty *pensionados* or holders of government scholarships, for the two years' course at the school. Buildings were erected and foresters were detailed from the bureau to give the technical courses in forestry, the auxiliary courses being supplied by the faculty of the College of Agriculture. This year the number of new *pensionados* has been almost doubled, one such position being made available from each province under the jurisdiction of the Philippine Assembly and from certain special provinces which are still governed directly by the Philippine Commission. These scholarships now pay the students twenty-five pesos per month in cash, and in addition they are provided with free living quarters and with most of the books and other supplies needed in their courses. A commodious mess hall has also been built by the bureau and is fully equipped with cooking utensils, dishes, etc. Here the students now run their own mess and secure excellent meals for about four dollars per month. They employ their own cook and are establishing a kitchen garden for growing their own vegetables.

The *pensionados'* traveling expenses to and from the school are refunded by the Bureau of Forestry and upon the successful completion of the course each such student is guaranteed a position in the bureau at a good salary without the necessity of taking a civil service examination. On accepting the scholarships, they, in return, bind themselves to enter the employ of the bureau on the completion of the work for as long a period as they shall have enjoyed the privileges of the scholarships. There are also several private students taking the course in forestry. No special inducements are made them, but they are furnished free quarters if such are available.

The new school year opened in June of the present year and in order to insure an adequate faculty the entire division of investigation of the Bureau of Forestry has been transferred to Los Baños in the province of La Laguna, where the forest school is situated. Residences and an office building have been constructed for the members of the division and the grounds around the buildings have been parked. Plans are now being made for the establishment of a large central nursery near the school which will be used not only for growing tree seedlings for extensive work in reforestation, but which will afford the students an opportunity to secure practice in nursery work and transplanting.

The faculty of the technical course in forestry is made up as follows:

Major George P. Ahern, professor of forestry;

Dr. H. N. Whitford, associate professor of forest botany;

H. M. Curran, associate professor of forest management;

Dr. F. W. Foxworthy, assistant professor of wood technology;

D. M. Matthews, instructor in forestry and secretary of the Forest School;

M. J. Oteyza, assistant in field methods.

In addition special lecturers will be detailed from time to time from the Bureau of Forestry for certain courses. It is apparent that the faculty is exceedingly strong. It was only made possible by transferring the division



A ROW OF STUDENT COTTAGES



A FOREST SCHOOL IN THE
PHILIPPINES

THE TENNIS COURTS AT THE FOREST SCHOOL.
THE FILIPINOS HAVE EAGERLY ADOPTED MANY
AMERICAN ATHLETIC GAMES



THE SALA OF THE FORESTER'S HOUSE



A FOREST SCHOOL IN THE PHILIPPINES

THE STUDENT MESS HALL

of investigation to the site of the school, so that the members of the faculty will be enabled to devote to their work of investigation such time as is not taken up by their lectures and field work.

Two years and a vacation period are necessary to complete the forest course, and only those students who have had at least two years' work in one of the government high schools, or its equivalent, are accepted. Arrangements, however, have been made with the College of Agriculture whereby students who lack such training can spend one or two years in preparatory work before they take up the exclusive study of forestry. The course at present is by no means designed to turn out scientifically trained technical foresters; if it performs the mission for which it has been established its graduates will be well-equipped to carry on the actual forest work in the field in the capacities of rangers and head rangers with the chance of promotion to positions which might be roughly compared to deputy supervisorships, or even to full supervisorships in the United States Service.

The outline of the two years' course in forestry is given below:

Junior Year.

Mathematics (geometry and trigonometry, with special attention to surveying).

Physiography, soils and climatology.

Mapping.

History, law, and procedure of forestry.

Forest botany and ecology.

Vacation Work.

Forest mensuration.

Lumbering.

Camp life.

Senior Year.

Wood Technology.

Forest Engineering.

Silviculture.

Forest Management.

The school is exceptionally well situated, about thirty miles from Manila, near the shore of the large lake known as "Laguna de Bay," which drains through the Pasig River into Manila Bay. Just at the rear of the school grounds is the boundary of the Maquiling Forest Reserve, embracing the forests on and around Mount Maquiling, a magnificent tropical mountain rising abruptly from a plain practically at sea level to a height of some four thousand feet. The entire forest reserve with an approximate area of fifteen thousand acres, embracing most of the principal forest types in the Philippines, is thus available for all kinds of field work necessary for a complete course in forestry with the exception of lumbering. To fill this want each class is required to spend one vacation period at the seat of some extensive lumbering operation where, under the supervision of the instructors of the school, they carry on field work analogous to that performed by students in the forest schools of the United States during their annual trips to lumber camps.

All in all the school has opened under exceptionally auspicious circumstances, and there is every reason to expect that it will speedily become recognized as one of the best second grade forest schools in the Far East, comparing favorably with those in Japan and the ones which the English have established in India and Burma.

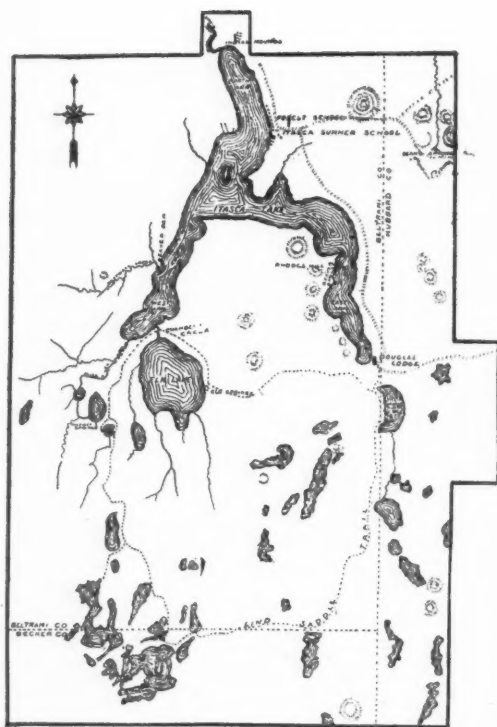
FOREST SCHOOLS OF THE UNITED STATES

II

College of Forestry, University of Minnesota

By EDWARD G. CHEYNEY, B. S.

PROFESSOR OF FORESTRY



MAP OF ITASCA STATE PARK
SUMMER HOME OF THE COLLEGE

THE forestry course of the University of Minnesota is organized as a college of the agricultural department, with its headquarters at University Farm, St. Anthony Park, St. Paul. This would seem to indicate a wide separation from the rest of the university in Minneapolis, but the difference is really only a matter of fifteen minutes and the students of the two divisions mingle more or less throughout the four years of the course. It is an integral part of the university and the students benefit by all the broadening influences that such environment brings.

The curriculum is a four-year course including the necessary basic sciences and the technical forestry required by the present conditions and the future development of the profession. The pure science is grouped in the first two years, so that any student who finds that he has selected the wrong course—as many are likely to do when a subject is popular, little known and

booming—may change without losing any credits. The whole course gives a broad scientific training which makes a good basis for any scientific work. This is important for it can no more be expected that every student of forestry

will become a forester than that every graduate of a medical school will practice medicine. At the same time the graduate is prepared for any work that the professional forester may legitimately be called upon to do. The entrance requirements are the same as for the rest of the university and are strictly enforced. Work done in other colleges and universities is accepted only in so far as it covers the course. Few substitutions are allowed and special students are not accepted unless they are older than the average and have had considerable experience along the lines they wish to study.

There are at present about 110 students in the college of whom fifty are freshmen. Many of these drop out before the second year. This is due both to the natural culling out of the weak members which occurs in all popular courses and to the fact mentioned above that many come into the course without knowing really what it is and later change to another course. The graduating class averages about fifteen.

The faculty consists of a director and two assistants, all trained foresters, to handle the technical subjects, and a number of professors from the academic and agricultural colleges to give the pure science and special courses. This faculty is further augmented by the State Forester, his assistants and various other special lecturers chosen from the lumbermen of the region and the investigators of the Forest Products Laboratory at Madison.

At St. Anthony Park all the general and all the theoretical work is given; as well as the manufacturing for which the mills and factories around Minneapolis give every facility. These are visited by means of class excursions. In addition to the school at St. Anthony Park the college has two forest experiment stations which play an important part in the school work. One of these, located at Itasca State Park, is the summer home of the college. About five thousand acres are here at the disposal of the school for experimental and demonstration purposes. The tract contains about every type found in the pine forests of the lake States. Here the freshman class works at elementary silviculture and mensuration from the first of June to the first of August, and the juniors have field work in advanced silviculture, seeding and planting, mensuration, engineering, plant pathology and entomology from the middle of April till about the first of September.

The equipment here consists of a bunk house and dining hall for the students, a row of four cottages for the faculty, an administration building and a large barn; all of logs. There is also a frame dwelling house for the foreman and a large seed house for the nursery. The whole camp is equipped with running water and up-to-date devices for sewage and garbage disposal. This part of the college is located in an ideal spot on the shore of Itasca Lake about a mile from the outlet where the Father of Waters starts on its winding way to the Gulf of Mexico.

The camp is to a large extent self-governing. The students form themselves into a club, hire their own cook, buy their own supplies, and board all other members of the camp who care to mess with them, thus getting cheaper board and the experience of running the camp. They also have their own gardens, sometimes keep their own cows and keep the camp in order generally. This summer's experience gives them an insight and an understanding of the proper point of view for their senior work as nothing else could and makes each man thoroughly familiar with the woods life in all its summer phases.

The second experiment station is situated about three miles from Carlton, Minn. It is a tract of 2,600 acres of typical northern coniferous forests. A neat little log cabin is the headquarters of the forest and a member of the faculty is stationed there in the summer. The tract is devoted to silvicultural experiments. The senior class students work on these experiments in the

spring, and make the station their headquarters when they go to the lumbering camps of that region in the winter. It is there that the great problems of the Lakes forest will be solved, and the original work of solving these problems will be a tremendous stimulation to both faculty and students, for no man can teach a subject successfully unless he himself is studying and developing it.

The curriculum has three objects in view: (1) the training of a competent and fully equipped professional forester; (2) a well-rounded scientific education; (3) the teaching of such subjects as will make a man at home and satisfied in the woods.

The first group naturally receives the most attention. It consists of courses in dendrology, silviculture, surveying, drawing, protection, mensuration, management, lumbering, lumber manufacturing, forest by-products, and forest economics, tree diseases, forest entomology and wood technology. The time spent at Itasca, Cloquet and the lumber camps is looked upon as laboratory work. The sophomores are encouraged to take jobs in the woods for the summer months and most of them are placed in the forests of the Rockies and the Pacific Coast.

A broad, all-round education is necessary both on account of the scope of the forester's duties and connections, and for the reason already stated that all those who study forestry will not continue in the profession. This is true at the present time and will be even more true in the future. The graduate school gets this work ready made, but the undergraduate school must do it for itself. To fulfill this object courses are given in botany, geology, chemistry, zoology, languages and economics. The amount of this work offered is limited only by the time available.

The third group receives the least time and attention but is nevertheless vital. No man can make a success of his business unless he is thoroughly interested in it and contented with it. This he cannot be if he is not in sympathy with his surroundings. There are no horse shows, theater parties, football games and other social amusements in the back woods where the forester's work will take him; there may not be a single soul within hailing distance with whom he can talk of the things which used to be part of his life. If he still depends on those things for his amusement he will be lonely and his trials will be many. All stones will be rock, all flowers brush, and all other forms of life varmint to be shunned or neglected as he may deem them dangerous or harmless. With botany, geology, zoology, entomology and a knowledge of game and fish every particle of woods life takes on an interest that is irresistible, and loneliness in the woods is almost impossible. This intimacy with woods life is no small part of the benefit of the months at Itasca.



PUBLIC ASPECTS OF FORESTRY

By H. S. GRAVES

(Address delivered at Bretton Woods, N. H., August 2, 1911.)

FORESTRY is a national necessity. There must be forests to provide the wood, lumber, and other products of trees required by the people. Forests are needed to protect the slopes of mountains, and to conserve the sources of rivers; and they are valuable as health and pleasure resorts, game refuges, etc. Altogether, they are practically indispensable to the general public. Extensive forest destruction invariably results in serious public injury. In a new country with extensive forests and a relatively small population the effects of forest destruction are not at first noticed. This has been the case in the United States and it is only recently that people have awakened to the realization of the economic loss already suffered by the country through unregulated exploitation and by forest fires. The United States can no longer afford to ignore the inevitable consequences of forest destruction.

FORESTRY A PUBLIC PROBLEM

Forestry is fundamentally a public problem. The purposes of forestry are essentially public in character. Forestry aims to continue the growth and production of the forests for future needs and to secure those general public benefits arising from the mere existence of forests.

The production of timber differs from that of other crops in the great length of time required to grow trees of useful sizes. In the case of field crops the quickness of results makes it profitable for private owners to use good methods, as soon as these can be demonstrated to them. The forest problem is different. A private owner ordinarily purchases timber land for the merchantable stock standing on it. This represents an accumulated growth of many years, often 200 to 500 years, or even more. The usual method is to cut the merchantable timber without reference to the future. Even when not followed by fire, the treatment is often destructive. There is a popular idea that if fires are kept out a forest will take care of itself, no matter how the cutting is done. In many places a forest cover is restored sufficient to conserve quality of soil, but the productiveness of forest measured in growth of valuable species of commercial quality will not usually be maintained without special attention. Forests as handled by most private owners continually decline in productiveness. The practice of forestry involves initial investments with a view to securing larger harvests in the future. Most private owners have been unwilling to make the investment in view of the length of time required to mature the crop and the risks from fire and other enemies of the forest, and because they fear that the present system of taxing growing timber will absorb possible profits.

It is true that forestry is being practiced today by some private owners.

Many farmers are handling their woodlands with great care and intelligence, and some large private estates are also handled along the lines of forestry. Among extensive timber tracts the number which are managed with a view to continuous production of trees is very small. It is safe to say that not over one or two per cent of the lumber on the market today has been cut with a view to continued forest production.

It is a matter of history that no country has solved its forestry problem except through the direct or indirect action of the government. The progress in all countries has been in direct ratio to the activity of the government.

The public may deal with the forestry problem in three ways.

1. By public ownership of forests.
2. By assistance to private owners in taxation and fire protection, and by co-operation in management.
3. By the regulation of privately owned forests.

PUBLIC OWNERSHIP OF FORESTS

While it is not practicable for the public to own all the forests, nevertheless direct ownership or control by the public of very extensive forests is essential to the working out of the country's problem in forestry.

The public forests constitute the foundation or nucleus for the development of forestry in every country. Those countries with little or no public forests are so far failing in their forestry work. It is the universal testimony of foreign countries that the public forests are too small; and that national interests would be better served if they were far more extensive. The present areas of public forests are in all cases what was left when the policy of disposing of them to private owners ceased. All countries which have adopted a national policy of forestry are trying to increase the public holdings, not to decrease them.

PAST MISTAKES IN HANDLING PUBLIC FORESTS

It has been the policy to dispose of the public lands in the United States as rapidly as possible in order to encourage the development of the country. The acquisition of land by private individuals was made easy in order to secure settlers. The wisdom of a liberal policy as applied to agricultural lands has been proved by the rapidity with which our country has been settled. Unfortunately, the early legislators did not display the same foresight with respect to forest lands as they did with agricultural lands. It is only recently that the public has come to realize that it has been giving over to private owners lands that ought to be held in perpetuity by the public itself. Agricultural lands ought to be privately owned, but there are certain areas in mountain regions and on soils not suited for cultivation which should be kept in forest growth and just as extensively as possible owned or controlled by the public.

A NEW PRINCIPLE IN OUR LAND POLICY

A new principal has been introduced in our public land policy, namely, that there are certain classes of land whose management vitally affects the public interest and which cannot be mismanaged without grave danger of direct injury to the public. Recognizing this principle, the government has already withdrawn from sale a large proportion of the public forest lands situated in the mountains, with a view to their protection and management for the permanent benefit not only of the present but also the future interests of the public. In the same way some of the states for public protection are

now purchasing forest land which under a mistaken policy was disposed of for private exploitation.

PUBLIC FORESTS IN THE UNITED STATES

The public forests in this country are owned by the Federal government, the states, various tribes of Indians, by municipalities, and by public institutions. The total area owned by the government, the states and the Indians is shown in the table which follows. There are no adequate statistics of the forests owned by municipalities and public institutions, but the aggregate is relatively trifling.

PUBLIC FORESTS

	Area-acres
National Forests.....	192,931,197 (Gross area)
	170,368,605 (Net area)
Indian Forests.....	10,000,000 approximately
National Parks	4,562,265
State Forest Reserves.....	3,253,185

The public forests comprise approximately 25 to 30 per cent of the forested area and about 9 per cent of the total land area of the United States. The area of private forests is therefore over three times that of public forests. The total amount of merchantable timber, however, in private ownership is five times that on public lands. The reason for this is that public forests are chiefly in the mountains and comprise what was left after the best was selected and acquired by private owners.

It is interesting to compare these data with those of European countries. In some of those countries the land was disposed of to private owners in much the same way as in the United States, so that the balance actually owned by the government is comparatively small. Thus, for example, only about 12 per cent of the forests of France are actually in government ownership, and yet forestry has reached a very high state of development because all forests are practically under the direct control of the state, which guarantees that they are properly protected and managed. In Germany, while the state owns about 40 per cent of the forests, fully 66 per cent of the total forest area is under public control. In Austria Hungary, France, Switzerland, Italy, Sweden, and Denmark, practically all the private forests are under state supervision. It is interesting to note that in Germany while private forests exceed in area the public forests, yet the amount of merchantable timber in the latter forests is about fifty per cent of the total. This means that in Germany the public forests are better stocked than private forests, which is exactly the reverse of the case in this country.

THE NATIONAL FORESTS

The national forests have been established in order that their resources may be developed under such restrictions as are necessary to protect the interests of the public dependent upon them. When they were first established there was a great deal of opposition because it was believed that they were to be closed to use and development. Their purpose is not to prevent use, but to prevent waste. The design is to replace the wholesale exploitation and destruction of the forests by protection from fires and wise use under forestry methods. It was natural that any restrictions were at first opposed by those who have always regarded the public resources as free for all. It is astonishing, however, how rapidly the people using the national forests have come to see

the public benefits of forest protection and forestry, and in most regions the opposition is being replaced by approval of the government's policy.

There is nevertheless still a very powerful opposition to national forestry and to the Forest Service. There are still many who would see the national forests entirely abolished and the old regime of unregulated exploitation of the nation's resources reestablished. This opposition to the Federal policy comes from two different sources. The first is the spasmodic local opposition due to difficulties arising in the local administration. These difficulties are usually adjusted without grave difficulty and the cause of the opposition disappears. The second source of opposition is of a more permanent character and comes from those who are fundamentally opposed to the idea of regulating the use of the nation's resources for the public benefit.

The national forest policy has received a great impulse through the passage of the Appalachian and White Mountain bill by Congress. This measure enables the Federal government to participate in the solution of the forest problem in the eastern mountains not merely through general advice to private owners, but through actual ownership and management of public forests. It is not expected that the government will be able to purchase all of the mountain areas which should be protected and handled mainly in the public interest. It will be possible, however, even with the appropriations already made, to establish a number of national forests on important watersheds which will serve as a nucleus for the development of forestry over large surrounding regions.

STATE FORESTS

The government has at different times made very extensive grants of public lands to the States. Thus in some of the states the government has, in addition to special grants, given two sections in every township, and in several states four sections in every township. It is estimated that something over nine million acres of the state lands are forested. Heretofore the policy of the public land states, except Minnesota, has been to dispose of their holdings as rapidly as possible by sale to private individuals. While in several of the public land states there is now an effort to protect the state forests from fire, but little progress has been made in the adoption of a policy of retaining these lands permanently for forest purposes. One reason why this policy has not been adopted is because the state lands are not in a solid body and are therefore difficult to administer. One of the most urgent needs is legislation which will enable the public land states to make exchanges for government lands and thereby consolidate their holdings into single large state forest reserves which can be handled with a view to permanent forestry. Bills have at various times been introduced in the Congress, looking to this result, but they have been consistently defeated, although it is obvious that both the government and the individual states would be enormously benefitted by such exchanges:

In the East just as in the West the states have disposed of their lands just as rapidly as purchasers could be found. They are now waking up to the realization that such a policy was a mistaken one and that the disposal of state lands should be confined to those of agricultural value and the timber lands in the mountains which must be handled conservatively for the protection of the public should be reserved in public ownership. The states are now beginning to recover by purchase those lands which should never have been parted with. There are now about three million acres of state forest reserves, distributed as follows:

Indiana	2,000	acres
New York	1,641,523	"
Pennsylvania	920,763	"
Michigan	231,349.58	"
Massachusetts	2,000	"
Connecticut	1,509	"
Maryland	1,960	"
New Jersey	13,720	"
Wisconsin	385,000	"
Vermont	1,760	"
Minnesota	51,000	"
Kansas	600	"
Total	3,253,184.58	acres

PUBLIC ASSISTANCE TO PRIVATE OWNERS

Forestry in this country will not be entirely solved merely by public ownership. Even with a considerable extension of the national forest system and with the establishment of large state forests, the amount of private forests will undoubtedly exceed that publicly owned. One of the most important problems, therefore, is that of the practice of forestry by private owners.

There are a number of ways in which the public, which has so great an interest in bringing about the practice of forestry, may contribute to help the private owner in overcoming certain difficulties which he faces in practicing forestry. This assistance must come primarily from the state and not from the Federal government. The Forest Service has authority to aid private owners through advice in methods of handling woodlands, and indirectly its investigations in methods of forestry are of great benefit to the private owner. In a limited way, also, the government is now assisting private owners through co-operation with the states in the protection of lands on important watersheds of navigable rivers. In general, however, the assistance to private individuals must be worked out by the states.

The most important duty of the states in this regard is the protection from fire. A number of states have recently taken an advanced position in this matter and have not only passed effective forest legislation, but have provided for the organization of fire patrolmen. It is not proper that the state should bear the entire burden of protecting private property, but it should furnish the machinery which will enable the proper organization of fire protection in co-operation with private owners. The reduction of the fire risk removes the greatest obstacle in the way of forestry. The second inducement for private forestry is the introduction of a fair system for the taxation of growing timber. The state may, further, render to private owners direct advice and assistance in methods of conservative handling of forests.

PUBLIC REGULATION OF PRIVATE FORESTS

The question has already come up in a number of states whether the public should place restrictions on the handling of certain classes of land in order to prevent injury to the public. I have already mentioned the fact that in most European countries there is a measure of public oversight of the management of private forests.

In many states there are already laws regarding incendiarism and responsibility for setting fires by carelessness or accident. In several states there are restrictive regulations regarding the use of fire in burning brush and clearing land, and in some laws have been passed regarding the disposal of brush after

logging. The position of the state is that a private owner should use reasonable measures to dispose of refuse after cutting when its presence is a menace to the surrounding country. I believe the time has passed when a private individual can handle his property in such a way as to subject his neighbors to the danger of great loss and the general public to serious damage.

The great danger is that laws will be passed which are so rigid as to be impractical of application. Any law touching the disposal of brush after logging or in other ways making restrictions with reference to fire protection, should be sufficiently elastic to meet the varying requirements of different forest conditions. A further difficulty in such restrictive legislation is that the tendency is to merely pass the legislation and not provide the proper machinery for its practical application. The work of reducing inflammable debris in the forests, the work of fire patrol and other measures of fire protection, must be worked out through co-operation between the private owners and an organization of competent state foresters. The state of New Hampshire has made a splendid beginning by establishing a forest organization and the private owners have shown their wisdom in uniting to introduce practical methods of fire protection.

There are certain areas on steep slopes of important watersheds where it is essential to protect the forest from destruction. I do not mean that no cuttings whatever should be made on such areas, but such cutting as is done must be of a character which will not result in public injury. In a number of state legislatures bills have been introduced looking to the designation of protection forests with a view to placing reasonable restrictions on the cuttings, in order to prevent complete deforestation and to guarantee a restocking of such areas as are cut over. This is a problem which is coming more and more to the front as the effects of complete deforestation are felt.

This is a problem which must be handled with the greatest wisdom. Some of the proposals which have been made are not practical in their application and would not secure the results desired. In working out this and other phases of private forestry, I would seek first the cooperation of the timberland owners themselves. If they are wise, they will see the importance of such co-operation, as a means of forestalling restrictions. In many cases they can introduce at once, if they will, measures of forestry which will fully meet the requirements of protection of the mountain slopes and watersheds. This is especially the case when they have the active assistance of the public in fire protection and in removing other obstacles which render forestry difficult to them. When the public has done its reasonable share, if timberland owners fail to introduce methods which accord with the public interest, they will have only themselves to blame for enforced regulations which they may regard as unfavorable to their private interests.

I have been continuously urging the public to meet its obligations in forestry. I have been urging also that private owners make a beginning in the practice of forestry, even though at first it is experimental, until each owner can determine how it may be worked out under the special conditions under which he is working.

I believe that ultimately there will be some public direction of the work of forestry on certain classes of mountain lands, just as is now the case in Europe. We are now endeavoring to handle the problem through the introduction of private forestry in co-operation with the states and the government.

THE SIHLWALD

An Example

By BARRINGTON MOORE, M. F.

THE first stage of the forestry movement in the United States has been characterized chiefly by efforts toward preventing forest destruction. A campaign was waged with such fierceness that there was danger of forgetting what forestry means to substitute for destruction. The following article is a single example of what forestry accomplishes, perhaps not for many years in the United States, but in a part of Europe where it has long been recognized and where most conditions are favorable.

In Switzerland less than twenty miles from Zürich lies the Sihlwald. This forest is on a river, the Sihl, which flows into Lake Constance; it belongs to the city of Zürich which itself controls the entire management. This forest has only approximately 2,560 acres, small as compared with forests in the United States, but of considerable importance.

The first cutting in this forest was in 1250, over 760 years ago. There was then no forest management, but a crude regulation, because cutting has been on the same rotation (period of years between the formation of a piece of forest and the time it is cut) ever since. The first actual management of the forest dates from 1802, and the first working plan was not made until 1845. Therefore, if we in the United States, where the word forestry less than ten years ago meant nothing, have as yet almost no working plans, we need not be discouraged.

The climate of the region is very much like that of northern New England, only slightly colder; the chief controlling factor, precipitation, is about the same, approximately 56 inches; heavy snows, causing considerable damage in the forest have been known as early as September 28th and as late as May 23rd.

The forest is composed chiefly of beech: This species forms 70 per cent of the total stand; ash and maple (three kinds of maple) form 15 per cent; and the remainder is made up of conifers, chiefly spruce, with some silver fir, larch and a little Scotch pine. The rock is a soft brown sandstone, largely decomposed, and covered with many glacial moraines and gravels. The soil is sandy with enough clay to prevent too great porosity, and with abundant moisture.

The management of this forest will be of great interest to all who know or care anything about forestry, whether technically trained or not. In the first place there is an excellent topographic map on a scale of 1 in 2,000, or approximately 6½ inches to the mile, large enough to include an abundance of valuable detail; with a contour interval of two meters (about 6½ feet); the important forest types; and also the working circles and compartments.

A working circle, as everybody knows, is a part of any forest tributary to a certain market, and from which a sustained yield of timber is obtained. Part of the working circle is cut each year until the whole has been covered; by the time the last part has been utilized the first part is ready to be cut again.

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A compartment is here a subdivision of a working circle used for convenience in regulating the cut. In the Sihlwald there are four working circles. The two principle ones (that is, the oldest and most productive) are situated on a long slope with a village at each end; each working circle supplying one of the villages. Of the other two working circles, one consists of newly acquired land along the same slope only further down stream, while the second is across the river, comprising an irregular forest on a steep rocky slope with a considerable proportion of conifers.

The rotation aimed at for the forest as a whole is 110 years. But certain conditions on each working circle prevent this: On working circle number I (compartments 1 to 8, inclusive) it is 90 years, because in 1845 the forest on 100 to 125 acres was destroyed by a heavy snow, and is now being worked back to normal; on number II (compartments 9 to 16, inclusive) it is 110 years, which gives beech of 40 to 50 centimeters (approximately $15\frac{1}{2}$ to $19\frac{1}{2}$ inches) in diameter at breast height; on number III (compartments 17 to 21, across the river) where there are many conifers but an irregular stand, it is 100 years; on number IV the newly acquired "Forst" comprising six compartments with considerable silver fir and Scotch pine, it is 100 years.

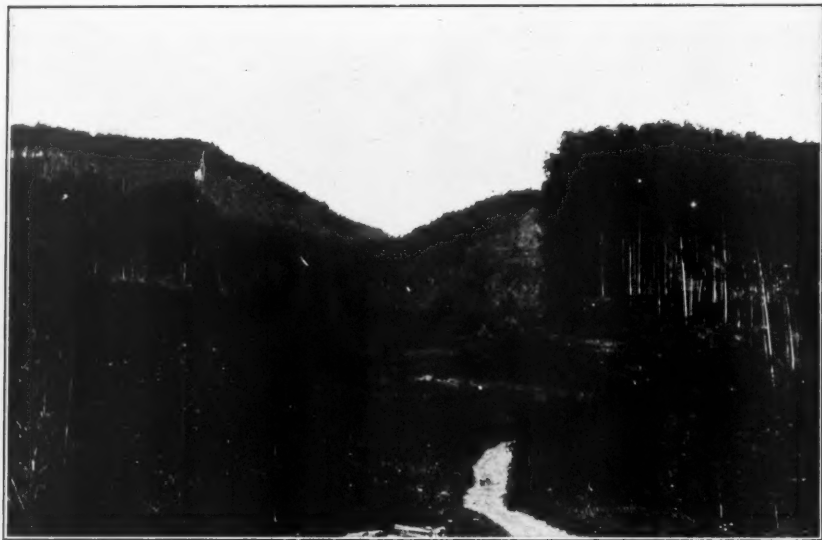
The silvicultural system is one which, in the East, could profitably be made use of in some of our easily reproduced hardwood stands, such as more or less pure stands of hard maple, beech, or mixtures of yellow poplar and oaks. Technically, it is known as the shelterwood compartment system without preparatory cuttings, and, in spite of its name, is comparatively easy to carry out.

The first step, when the stand has reached maturity (this could be almost any age desired by the owner, provided the trees are old enough to produce good seed, are more or less even aged, and form a pretty full stand) is to make the first cutting: this is a heavy thinning which gives light enough for the seed to germinate, and, in this case, removes about 30 per cent of the total volume. It goes without saying that the poorer trees are taken and the thriftier ones left for growth. After a four or five years' interval when the reproduction is old enough to begin to suffer from the shade of the older trees, a second cutting is made by which another 30 per cent of the volume is removed, leaving only the thriftiest trees which will make a very rapid growth in diameter, and which will also protect the reproduction. Of course, the length of this period, in Europe and in America as well, will vary with the species handled and with the site quality: on good soils with rapidly growing species it will be much shorter than on poorer soils with a slower growing species. It will also vary with the severity of the first cut. If the first cut has been very heavy, it will not be necessary to return so soon; but on the other hand there is the danger, if the cut is too heavy, that the soil will be unduly exposed to drying out or to the entrance of weeds and brush which will prevent reproduction. The third and last cutting is made three or four years later. At that time the blanks which occur on account of partial failure of natural reproduction are planted with spruce wherever the soil is sufficiently favorable (which is almost everywhere); and wherever it is unfavorable these spots are planted with alder and underplanted with spruce in the protection of the alder. Thus at the last cutting a forest about 12 years old is left on the ground.

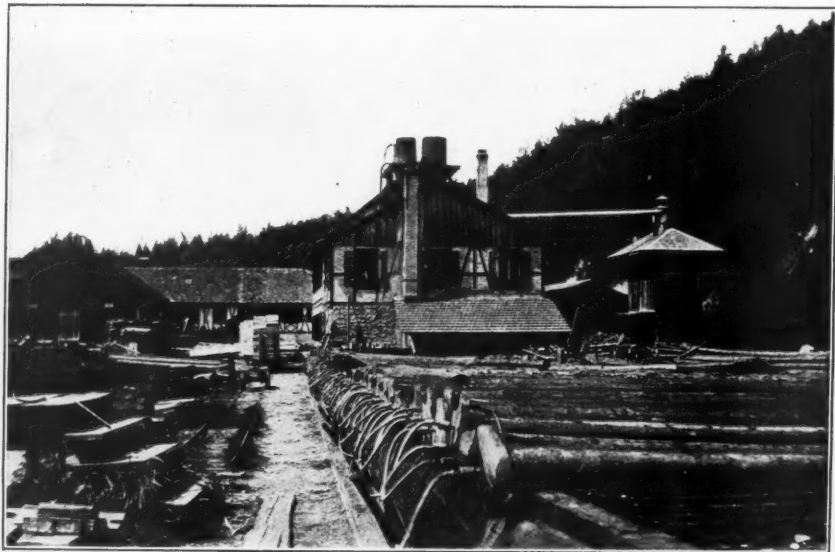
The tending of this forest is the next point of interest which may offer some general suggestions for the management of similar woodlands in the eastern United States. When the stand is 15 years old they make a "cleaning" to regulate the mixture and give the more valuable species, such as the ash, spruce, etc., a chance against the beech. In Switzerland the demand for forest



A FIFTEEN TO TWENTY YEAR OLD STAND OF BEECH BADLY DAMAGED BY THE HEAVY SNOW OF MAY 23, 1908, (JUST TWO MONTHS BEFORE THE PICTURE WAS TAKEN). THE DEBRIS ON THE GROUND IS FROM THE BROKEN TOPS



A GENERAL VIEW OF PART OF THE FOREST. LOOKING ALONG A LINE BETWEEN TWO COMPARTMENTS: A BODY OF MATURE TIMBER ON THE RIGHT; DIRECTLY BESIDE IT ON THE HILL IS A PATCH CUT AND REPRODUCED AFTER THE SNOW BREAKAGE OF 1885. ON TOP OF THE HILL ON THE EXTREME LEFT IS A STAND NEWLY OPENED UP FOR REPRODUCTION. IN THE FOREGROUND IS NATURAL REPRODUCTION OF BEECH WITH SPRUCE PLANTED IN THE OPENINGS



THE SAWMILL AND TREATING PLANT. IN THE RIGHT FOREGROUND ARE SPRUCE POLES BEING TREATED BY THE BOUCHERIE PROCESS; THE COPPER SULPHATE COMES FROM THE TANKS ON THE BUILDING IN THE BACKGROUND. THIS BUILDING CONTAINS THE TURNING LATHES, EXCELSIOR MACHINE, AND CORDWOOD SPLITTER. THE LOW BUILDING ON THE LEFT IS THE SAWMILL. IN THE LEFT FOREGROUND MAY BE SEEN THE CANAL BY WHICH THE WATER IS DIVERTED FROM THE RIVER TO GIVE THE POWER

products is so great that the results of these cleanings are sold for fuel even down to the smallest twigs, something which will be possible nowhere in America. At twenty years the stand is thinned again by the removal of all forked, ill-formed, suppressed and sub-dominant trees, and the mixture regulated. One thinning at this age gave as much as 160 cubic feet (the equivalent of over two stacked cords) of fuel wood per acre. The result is, of course, rather an open stand; but the trees are young and vigorous and soon form a close canopy.

When the stand is between twenty and fifty years old thinnings are made whenever needed to increase the growth of the stand, generally every five to seven years, though this, of course, varies with the quality of the soil and the aspect. It has been found that aspect, on the the Sihlwald, has more effect in increasing growth than has the quality of the soil, growth being most rapid on south exposures. But it is only in climates with abundant moisture that the southern exposures are favorable; for wherever moisture, though it may be sufficient for tree growth, is less ample than here the south slopes will probably be the unfavorable, rather than the favorable, ones.

When the stand has passed fifty years of age, thinnings are made less often, only every ten years, because growth is slower.

The golden rule in thinnings, whenever market conditions will allow, is to make them light and often, rather than heavy and at long intervals. This is particularly important on the poorer sites.

Advance reproduction that occurs before the stand is sixty years old is cut back because it is generally suppressed and crooked; that occurring after sixty years is left.

The yield obtained from the Sihlwald is well worth considering as showing what very intensive management, coupled with favorable conditions, can produce. On an average for the forest as a whole the yield from thinnings alone is approximately 10 cubic feet per acre per annum. The increment is 32 cubic feet, an equivalent of approximately 230 board feet. For comparison it may be stated that the increment under moderately favorable conditions in some of the Rocky Mountain forests in the United States is 100 board feet per acre per annum, and less.

An interesting point is the servitudes or free uses on this forest. Being such an old forest, and belonging to a large city, one would expect to find innumerable rights of users. On the contrary, no servitudes exist; whether they had never been allowed to grow up, or had been bought out, or had been merely abolished by law, could not be determined. At any rate the nearest approach to rights of user is the gathering of dead wood by the poor people once a week (every Wednesday); but, since they must buy a permit, costing one dollar per year, for this privilege, it cannot be considered a right of user. It is also of small value, since the utilization is so close that there is very little dead wood left to gather.

In the utilization of its resources the Sihlwald sets an example worth following for forest owners situated under equally favorable market conditions. The important point is that the city, instead of selling stumpage, as many owners in the United States are now compelled to do, does all the exploiting itself; it not only fells the trees and hauls them out, but actually saws them up into finished lumber, and even makes tool handles and excelsior.

All cutting, even in thinnings, is done after the leaves fall and before January. The logs are hauled out on the snow or on a narrow-gauge tramway run by gravity. The products of the thinnings are worked up in summer on the ground. They have devised a most ingenious scheme for extracting cordwood. Slides are built of parallel poles 4 to 6 inches in diameter, the cordwood is

loaded onto a sled which goes down one of the slides by gravity and, as it goes down, pulls up an empty sled on a parallel slide by means of a thin cable attached to both sleds and passing through a pulley at the top of the slides. This is done in summer as well as in winter.

The demand for wood is so great that even cordwood is sold by classes, as follows: (1) split and stacked; (2) large faggots about 2 inches in diameter (some of them split) made up into short bundles 8 to 12 inches in diameter; (3) small faggots, all the small branches worked up into neat little bundles.

They have their own sawmill on the River Sihl run by water which gives them approximately 100 horsepower. The logs are sawn on a band saw, generally to special order. Then there is a cut-off saw for cordwood billets and a splitting machine; an excelsior machine; a narrow band-saw for cutting out tool handles, implements, etc., and a turning lathe. In addition they have an impregnation plant for treating large timbers, generally spruce and beech poles, by the Boucherie process (copper sulphate), and a small dry kiln for boards and excelsior bolts.

The organization necessary to carry on all these operations is worth notice. The entire administration centers in the Department of Finance of the City of Zürich. The forest itself is in charge of a *forstmeister*, a man of standing not only in the profession and community, but in the country at large; he was at one time a general in the Swiss army, and president of the *Conseil d'Etat*, virtually President of the Swiss Republic. Under the *forstmeister* is a *forstadjunct*, corresponding to the deputy supervisor and forest assistant in the United States Forest Service. Under the *forstadjunct* are three clerks: the first for forest management; the second for the impregnation plant; the third for the sawmill. Then there are four forest guards, one for each working circle. In addition they have a force of one hundred permanent laborers paid by the day or month, and an extra force doing piece work.

The financial returns from this, one of the most highly developed examples of forest management in the world, will certainly interest the American reader because the first question which the forest owner asks of the forester is "Will it pay?" If not, it is useless to ask any one but a philanthropist to practice it; and forestry must not become synonymous with philanthropy.

In 1907, an average year, the net receipts from this small forest of approximately 2,560 acres were \$19,656.80, or a revenue of \$7.69 per acre.¹

But it would be wrong to point to this handsome revenue without showing the expense necessary to the production of it. For it is time that the public who, with the best intentions in the world, clamor for the practice of forestry by states and private individuals, should realize that forestry costs money, often a great deal more money than is justified. In the Sihlwald the expenses, excluding interest charges, were \$89,897; when we add a heavy interest charge² this becomes a considerable sum to spend on a small forest in a single year. The moral is that to get money one must pay out money in forestry as in everything else.

The example given by the Sihlwald is one which, in the United States, it will be impossible to follow on a large scale for many years to come. However, it should not be long before it can be applied, by owners possessing the forests and the means, to smaller tracts in the East. Meanwhile it shows what forestry is aiming at and hopes some day to accomplish.

¹The figures are always kept on the basis of hektars (2.5 acres) and francs (20 cents). There will be a slight error in converting to acres and dollars because a hektar is not exactly 2.5 acres nor is a franc exactly 20 cents. The figures are, however, close enough for all practical purposes.

²This charge could not be ascertained.

FOREST SCHOOLS IN THE UNITED STATES

III

University of Nebraska Forest School

By O. L. SPONSLER

PROFESSOR OF FORESTRY

IN THE fall of 1903 the University of Nebraska established a Department of Forestry. The demand of many for a general knowledge and of a few for a technical training in forestry furthered by the urging of

Benjamin E. Andrews, the chancellor at that time, and Dr. Chas. E. Bessey, brought about the desired result. Courses in forestry were organized and a group of required subjects were recommended to cover four years' work in the university. At the present time the full amount of forestry work extends over a period of five years. At the end of four years of satisfactory work a degree of Bachelor of Science in Forestry is granted. An additional year of certain required work entitles the candidate to a degree of Master of Forestry provided he has had a year's practical experience in field work. The degree is not granted until this last provision is complied with.

In considering the schedule it was thought best to have the work so arranged that the student must take at least one course in forestry each year. The first year student, by taking a general course, is given an insight into the subject he intends to make his life work. The interest thus started is kept up in the second year by making a detailed study of the important species of trees; in the third, by investigating the use of the many products of the forest, and the methods and costs of obtaining them. In the senior year the more technical forestry work is studied, that dealing with the measurement and production of the forest crop; and in the

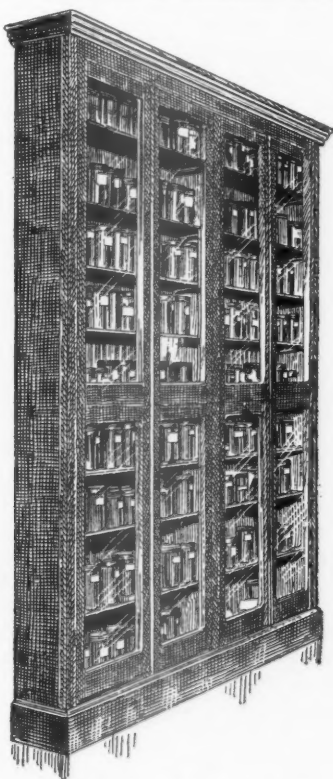


FIG. 1. WORKING COLLECTION OF FOREST TREE SEEDS

post-graduate year the matter of handling the forest according to good business methods is accompanied by a study of the policy of the nations in caring for their forest resources. During the past seven years the working of the schedule has been watched closely and a few changes have been made to bring about a more logical and efficient sequence of studies. The correlation of subjects may be shown best by considering various courses as they pass from one year to the next constituting more or less closely related groups.

Botany forms, perhaps, one of the strongest groups in its progression of courses. In the first year the structure of plants in general and a survey of the plant kingdom from the lowest forms through the flowering plants is studied. This is followed in the second year by the principles of classification of the flowering plants, with special stress laid on a study of the grasses. After this



FIG. 2. ONE SECTION OF DRAWERS CONTAINING A WORKING COLLECTION OF CONES

acquaintance with the plant families, the student, during the next two years, takes up work on the functions and life processes of various parts of plants, the structure and development of tissues and lastly the relation of plants to their environment. A great deal of attention is paid to botany, especially systematic and ecological, for it is felt that a good foundation in these subjects as well as in physiology and anatomy, is well worth the time of the forester.

The relation and sequence of courses leading to the advanced work in forestry may be shown in two groups. One, with forest mensuration as the climax, includes physical geography, mathematics, and lettering and drawing in the first two years as preparatory to surveying, which is followed by forest mensuration in the fourth year. The other group, with a rather complex course in silviculture at the end, comprises a number of courses not closely related to each other but all needed for the final work. The fundamental subjects in chemistry, geography, physics, entomology and botany are given

in the first two years; while the more advanced work in plant physiology, a study in the tissues of woody plants, and a lecture and laboratory course on the origin, nature, and properties of soils, is given in the third year just preceding the study of silviculture.

Preparation in rhetoric includes six courses covering three full years.

In addition to this, reports on various forestry subjects are required throughout the whole undergraduate work, besides a thesis in the fifth year. Many of the themes given in the rhetoric courses are corrected in the Forestry Department for scientific accuracy and in the Rhetoric Department for English.

It is only through the harmonious relations of the various departments and colleges that the sequence of courses is made valuable. The College of Engineering has granted special courses in drawing, timber, physics, and surveying, which are adapted to the needs of the forester only. Departments of Zoology and Entomology offer courses which apply to the forests from economic viewpoints. Several courses in botany have been inaugurated especially for foresters; among them are included a course on the development of the tissues of woody plants, a study of the structure of important woods with relation to their identity and their



FIG. 3. PART OF THE FOREST FUNGI COLLECTION

physical properties, courses in forest ecology and forest mycology.

The apparatus for laboratory and field work in the Forestry Department is closely interwoven with that of the Botany Department. The well-equipped laboratories and green houses, and the herbarium of about 300,000 specimens belonging to the Botany Department are thrown open to the use of the foresters. In addition to these concessions, the Forestry Department maintains a separate green-house for experimental classwork and a number of working collections of various parts of forest trees.

For the study of woods there is a type collection of all of the important and a great many of the minor species, labeled and placed where they are readily accessible to the students. Independent of this a working collection of all of the economic woods is maintained, containing twenty-five to fifty specimens of each kind, for use in identification and study of structure. Many sections of the logs of our timber trees allow the student to investigate the structure and growth of bark, sap-and-heart-wood and annual-rings. The woods laboratory also contains collections of stained and variously finished

specimens, cypress knees, enormous burls, and samples of special uses of trees such as ship-knees. It is equipped with the necessary apparatus for sectioning and mascerating specimens, with compound microscopes and large charts illustrating sections of various woods. Each student is assigned a locker where his individual assortment of woods may be kept unmolested.

For use in dendrology there are three separate working collections; seeds, cones and a leaf and twig herbarium. The seed collection contains samples of about two hundred species, nearly a third of which are conifers. The seeds are kept in screw-top glass jars containing on an average a half-pint of each kind. The cone collection is kept in herbarium cases fitted with drawers of two sizes. It contains from twenty-five to several hundred cones each of over seventy-five species. These collections are for the use of the student who is required to dissect and study both seeds and cones. The leaf and twig herbarium is also a working collection, and is quite independent of the large botanical herbarium mentioned above. It contains mounted specimens, about fifteen to twenty each, of the more important trees of the United States. Over two hundred species are represented.

A collection of about one hundred fungi important to the forester is made available for study in forest mycology by allotting species to drawers similar to those used for the cones. Here wherever possible a section of the wood and bark accompanies the fruiting body.

Exhibits of logging and saw-mill tools, samples of the results of many methods of close utilization of woods, stereopticon slides and enlarged photographs are used to illustrate lectures on logging, lumbering and methods of manufacturing forest products.

For use in forest mensuration, laboratory and field, an assortment of instruments for both accurate and rough work is provided. Included in this are instruments for mapping and for measuring heights, diameters, and volumes of logs and trees. They are of various makes and patterns giving the student a chance to compare the merits of one with the other. About forty complete stem-analysis sections are provided for volume and growth studies.

In order to show the difference between seedlings grown in various regions and between different grades in the same region, several hundred specimens have been mounted on herbarium sheets and these filed in cases where they are readily available. Two hundred and fifty stereopticon slides are used to supplement the lectures on nursery work and planting.

The post-graduate year demands original work in at least two courses. To this end, a research room is well equipped with the apparatus and materials that are needed. The Botanical Library, which is one of the very few complete technical libraries of this kind in the United States, is open to the post-graduate. The Forestry Library contains a complete set of all the Forest Service publications, card-indexed according to subject-matter, many English, German, and French volumes on Forestry subjects, a set of files containing several thousand bulletins, circulars, and clippings from lumber and forestry journals. All of the material in the library is made usable by means of the card index system. The subjects are listed in a very simple way so that every item is available to the student and can be obtained at a moment's notice.

For experimental field work the department has fifty acres of plantations of various species growing under many conditions. A one-acre nursery is provided with water system and with concrete seed-beds for special lines of experimental work. The university is located only a few hours' ride from the Government Nursery at Halsey, Nebraska, where the students may have an opportunity of inspecting tree-growing under very exacting conditions. Every two years the upper classes spend three or four weeks in northern

Wisconsin making a study of logging, milling and manufacturing methods of both the hard-woods and the soft-woods. Every year the dendrology class spends a short time at the arboreum of the late Honorable J. Sterling Morton and in the forest growth along the Missouri River.

In order to stimulate individual work in research, to give the student experience in publishing articles and furnish a ready means of putting valuable little scientific items on forestry into print, the Forestry Club puts out an annual publication of about one hundred pages. The author of each paper is afforded the chance to supervise all of the steps of proofreading and corrections incident to the printing of his article.

The graduate work includes, besides the forestry subjects taught in the class-room, a course in research on some forestry problem and a thesis, also on a forestry problem. A final year's work in rhetoric is required in which the themes are based on forestry subjects. These courses give the candidate a chance to become well acquainted with the literature on forestry besides giving good practice in writing. In addition to the required university work the candidate must have had at least one year's practical field experience along forestry lines. This experience may be obtained by using the vacations of four summers or by remaining a solid year in the field. The

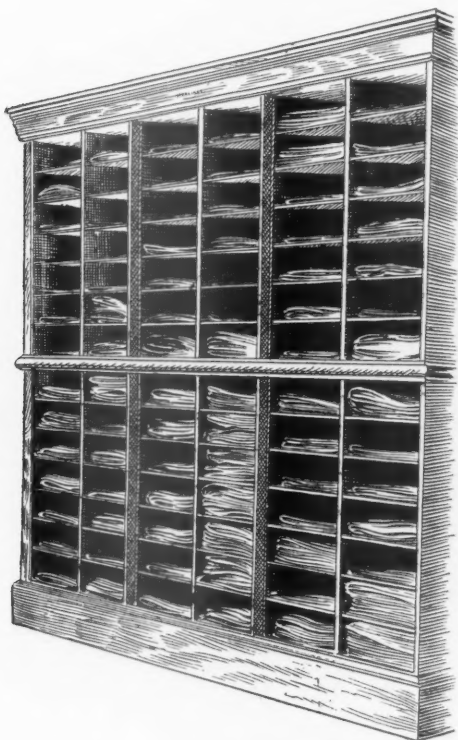


FIG. 4. FOREST TREE SEEDLING HERBARIUM

location of the University of Nebraska is such that this ruling is not a hardship to the candidate, for, the Lake States, the Ozarks, the Colorado Rockies, the Black Hills are not far from Lincoln, and are about equally distant, while but a short distance farther the Southern Pineries, the Southwest or the Idaho-Montana region is reached.

Provision is made in the graduate school for inter-changing majors and minors between forestry and several other departments, giving the graduate student an opportunity to specialize in many lines. For instance, he may combine forestry with grazing, pathology, entomology, or engineering.

FOREST SCHOOLS OF THE UNITED STATES

IV

Colorado School of Forestry

BY P. T. COOLIDGE, M. F.

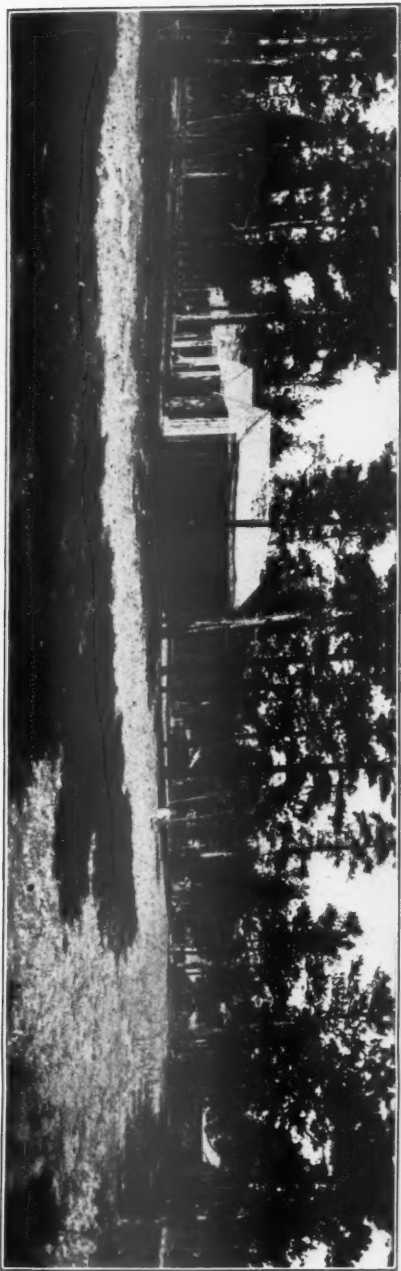
DIRECTOR OF FORESTRY

LOCATED in Colorado Springs, Colorado, at the doors of the western national forest region, is the Colorado School of Forestry, a department of Colorado College. The school was founded in 1905 through the generosity of General William J. Palmer and Dr. William A. Bell, who presented to the college for a field laboratory in forestry a tract of timberland of 10,000 acres, known as Manitou Park. This tract is about twenty-five miles from Colorado Springs, in the mountains north of Pike's Peak. The Colorado Midland Railway, which runs about seven miles south of it renders it very accessible.

The park is about two-thirds timbered, principally with Western Yellow Pine. The forest has a small admixture of Douglas Fir, and the other important Rocky Mountain species such as Engelmann Spruce and Lodgepole Pine grow on the Pike National Forest, which borders the park on three sides. The forest at Manitou Park is largely mature or has been lightly culled by early lumbermen. A working plan for the tract was prepared by students in the spring of 1910 and this is being carried out by the following classes with whatever modifications and additions seem desirable as the result of more detailed study. Logging and sawmilling are carried on during most of the year by contractors who purchase stumpage. The markings of trees to be cut is done by the students and they are thus given opportunity to direct conservative lumbering and to study logging and milling. The tract is therefore being managed so that it is a valuable object lesson in practical forestry. The summer courses in the School of Engineering of Colorado College as well as in the School of Forestry are conducted at Manitou Park, the students living in a group of cottages called Camp Colorado, located in the pines.

The courses offered by the Colorado School of Forestry are a four-year undergraduate course leading to the degree of forest engineer and a two-year graduate course leading to the degree of master of forestry. The first two years of the undergraduate course are devoted to general academic studies: Languages Mathematics and Science given in the Liberal Arts and Engineering Departments of the college. The last two years are devoted to technical forestry. The courses given in these two years aim to give complete training to men who wish to become technical foresters. The undergraduate course prepares for any branch of forestry, but on account of the school's proximity to the national forests, it is particularly well suited to fit men for employment by the Forest Service on these national forests. By frequent trips of inspection it is possible for students to obtain direct instruction in the work on the national forests such as timber-cruising, timber sales, planting and nursery work, grazing, special uses, and other phases of the work.

The two years' graduate course is intended for students who wish to



FOREST SCHOOLS OF THE UNITED STATES—IV.

CAMP COLOHADO, MANITOU PARK



STUDENTS MARKING TREES TO BE CUT. VIRGIN WESTERN
YELLOW PINE FOREST, MANITOU PARK, COLORADO



CONSERVATIVE LUMBERING, MANITOU PARK. MATURE
TREES REMOVED LEAVING YOUNG TREES FOR FUTURE
CROP. BRUSH PILED FOR BURNING ON ACCOUNT OF PROX-
IMITY OF HIGHWAY

FOREST SCHOOLS OF THE
UNITED STATES-IV.

specialize in forestry after a general academic or scientific course. The program of studies is like that of the last two years of the undergraduate course.

Instruction in the field is an important characteristic of all courses in the Colorado School of Forestry. The summer courses in Surveying, Forest Mensuration, and Silviculture occupy twelve weeks. The summer work is divided between two summers, beginning early in June and lasting into July each year. In the undergraduate course, for example, students do their summer work at the end of freshman and sophomore, or sophomore and junior years, as they choose. The summer courses are open to such special students as have sufficient preparation. In the fall of the final year in forestry, a trip of about two weeks is made to inspect some large lumbering operation, generally on the national forests. After the first of April of the same year, the students are transferred for mapping, estimating, and preparation of working plans either to the Manitou Park tract or to the national forests. Day and half-day trips are made frequently throughout the year in connection with the courses in Silviculture, Forest Extension, and others.

In addition to the courses in technical forestry described above, the Colorado School of Forestry gives a ten weeks' Ranger Course in co-operation with the Forest Service. This kind of instruction is of great value in giving the men who are actually engaged in the protection of the national forests a general idea of the principles of forestry. It is given during the winter, when the national forest rangers find field work out of question in most places on account of the snow. It consists of two or three weeks of lectures at Colorado Springs, followed by several weeks of field instruction at Manitou Park. As the altitude at Manitou Park is only about 7,500 feet, the winters are fortunately very open.

The enrollment in the undergraduate course numbers thirty to thirty-five. The graduate course was established only last spring (1911). The instruction in the undergraduate course began in the fall of 1906. The enrollment in the last session of the Ranger Course was sixty, but as the plan of detailing the men on pay, then in vogue, is now considered illegal, it is probable that numbers at the next session will be considerably smaller.

The faculty of the Colorado School of Forestry consists of the professors and instructors in Academic and Engineering courses in Colorado College and two technically trained instructors in Forestry.

Other advantages of the Colorado School of Forestry are the Fremont Experiment Station of the Forest Service about seven miles from Colorado Springs, the Monument Nursery on the Pike National Forest, a school forest nursery and greenhouse in Colorado Springs, and a wood-testing laboratory. At the Fremont Experiment Station, silvicultural and meteorological studies are being conducted by the Forest Service. In the wood-testing laboratory is a 100,000-pound Riehle machine for tension, compression, shearing and transverse tests.

The students conduct a Forestry Club which meets fortnightly. It is possible for Forest Service officials, located on the national forests near Colorado Springs, as well as other experts, to address the club frequently on various matters pertaining to forestry. The club serves to hold the interest of the underclassmen in the years when they feel that mathematics and general science are not as interesting as forestry and it also gives valuable hours for discussion of technical questions.

The school enjoys a wide reputation and is growing rapidly. Men who have come to it, as about one-third of the students do, from east of the Mississippi, feel that they are getting a true taste of their future work when they are called upon to help put out fires on the nearby Pike National Forest.

TEACHING FORESTRY BY PICTURES.

THE fondness of children the usefulness of for pictures is proverbial, and pictures as an educational device is recognized by all teachers. Many a child has received through the medium of pictures, lessons which it never would have learned otherwise. Some minds receive impressions through the eye much more readily and retain them more faithfully than through any of the other senses. Thus pictures often do what oral instruction fails to accomplish.

Seeking to take advantage of this faculty of the child mind, and to teach in a novel and interesting way the lessons of the usefulness of forests and the necessity of forest conservation, the United States Forest Service has recently prepared a traveling exhibit of photographs for circulation among schools and libraries. This exhibit is sent free of charge, except that the institution to which it is sent is asked to pay the transportation charges. These are not large, since the whole exhibit, when packed for shipment, weighs about 15 pounds.

There are 44 large pictures in the exhibit, arranged in 11 sets, the four in each set all bearing on a single general topic. Each picture has a descriptive label attached to it, so that the entire set of 44 pictures, with descriptions, makes up a sort of illustrated serial story about the forest.

The following are suggestive topics, each of which is illustrated by a series of four pictures:

"Forest Fires."

"Lumbering."

"Forest and Water Supply."

"How the National Forests Are Administered."

"How the National Forests Are Used."

The photographs are mounted in such a way that the whole exhibit can be easily and quickly hung on the wall for display and as easily taken down. Each set of four pictures is fastened on a strip of green denim cloth, 16 inches wide and 4½ feet long. In the upper corners of these strips of cloth are large eyelets by which the strips may be hung on hooks or nails or suspended by cords or wires. The whole exhibit, when displayed, covers a wall space 16 feet long and 4½ feet high.

Any school, library, or other educational institution desiring to secure this exhibit should write directly to the Forester, Washington, D. C., stating about what date the pictures are wanted. The usual period for which they are loaned is from one to two weeks, though this time will be extended on request if the demands for the exhibit are not too pressing elsewhere. Teachers of geography, agriculture, and manual training will find this exhibit extremely interesting and helpful. They have also been used with gratifying results by women's clubs and similar organizations on the observance of special "forestry" days.

FOREST SERVICE EXHIBIT

TEACHING FORESTRY BY PICTURES—PLATE I.





FOREST SERVICE EXHIBIT

TEACHING FORESTRY BY PICTURES—PLATE II.

FOREST SCHOOLS OF THE UNITED STATES

V

Forestry at the Iowa State College of Agriculture and Mechanical Arts

BY G. B. MAC DONALD

ASSOCIATE PROFESSOR IN CHARGE OF FORESTRY

THE Iowa State College at Ames is situated thirty-eight miles north of Des Moines at the junction of the north and south branch and the main double track line of the Chicago and Northwestern Railroad running between Chicago and Omaha. Ames is easily accessible from all directions. The college has a very delightful and healthful location on high rolling land, bordering the city of Ames on the west. The electric line of the Fort Dodge, Des Moines and Southern Railway has a station on the campus and gives two-hour service both to and from Des Moines, as well as thirty-minute service between the city and the college. The college land comprises 1,200 acres, of which 125 are devoted to campus. In laying out the campus years ago, the natural landscape effect was preserved and today the grounds present the appearance of a spacious park dotted with groups of evergreens and deciduous trees. Near the middle of the campus, the Central and New Agricultural Buildings have been erected at a cost of \$375,000 and \$350,000 respectively, adding in their beauty and stateliness to the attractiveness of the campus.

The Iowa State College of Agriculture is well equipped for giving the student thorough training in the basal sciences which will serve as a substantial foundation for technical training and practical work in forestry. As a division of agriculture, forestry is well placed in the Agricultural College, where the fundamentals of the science are given special emphasis.

Forestry instruction has been given since 1877 when Mr. J. L. Budd was elected Professor of Horticulture and Forestry. From the elementary instruction given at that early date the work has been increased to the present status comprising 550 hours' lecture and class-room work and 525 hours of field and laboratory in forestry subjects in addition to the basal and allied branches. The course is undergraduate and requires four years for completion. It is designed to give the student as much practical experience as possible along with the class and laboratory work. The college year beginning in September and ending in June, is divided into two terms of approximately four months each. During the summer months the students find employment in national forest work or in lumber camps where they are able to observe and practice present day forestry. College credit is granted to students engaging in practical work provided such work is taken up through the direction of the department and a detailed report of merit submitted.

Most of the technical work in forestry comes during the last two years of the course. In the first year only one forestry subject is given, elementary

in character, and required of all students in the Agricultural Division. The first two years of the course are arranged primarily for giving the student adequate fundamental training in those branches which should be completed before the more technical subjects in forestry are attempted. The course in Farm Forestry is designed especially to meet the needs of the Iowa farmers. Attention is given to the influence of forests in the modification of climatic conditions with special reference to the effect of windbreaks in agricultural districts. The production of fence posts, poles, lumber and fuel on the farm is considered in the study of prairie woodlots. A part of the course is given over to work regarding the utilization of the poorer classes of timber especially in connection with preservative treatment. In addition a general survey of the field of forestry is included which makes the course of more interest to regular students of forestry.

TECHNICAL FORESTRY SUBJECTS

First year	Farm Forestry.			<i>First Term.</i>
	<i>First Term.</i>			Silviculture.
	Lumbering.	Second year		<i>Second Term.</i>
	Forest Mensuration.			Silviculture.
	Forestry Seminar.			Dendrology.
	Dendrology.			Forest History and Policy.
	Forest Surveying.			Forest Economics.
	Lumbering Trip.			<i>First Term.</i>
	(Winter vacation.)			Forest Management.
Third year	<i>Second Term.</i>			Forest Protection.
	Forest Utilization.			Forest Administration.
	Forest Mensuration.	Fourth year		Forestry Seminar.
	Wood Technology.			<i>Second Term.</i>
	Camp Technique.			Forest Management.
	Timber Testing.			Mycology and Forest
	Forestry Seminar.			Pathology.
	Forest Surveying.			Forestry Seminar.
	Range Forage Plants.			Thesis.

In the second year two courses in silviculture are required. During the first term the fundamentals of silviculture are taken up in the class room; the silvics of the more important trees of the vicinity are studied in the field and the silvicultural systems of handling woodlands are considered in detail with special reference to their adaptability to American conditions. In the second semester the work deals largely with seed collecting and forest nursery practice. The department is maintaining a nursery where the students are required to acquaint themselves with all operations from the testing of seeds to the final planting of nursery stock. The two terms of dendrology extend through the last half of the second year and the first half of the third year. The work consists largely in field study, but is supplemented with laboratory work and lectures. The campus and forest garden are well supplied with a large number of tree species both native and exotic, which afford the students an excellent chance for first-hand study. The course in Forest History and Policy is designed primarily to give the student a brief survey of forestry as it developed in the more important countries from the earliest times. The relation of forestry to the other industries; its bearing on agriculture, manufacturing and commerce, is considered in the course in Forest Economics. In



FOREST SCHOOLS OF THE
UNITED STATES-V.

AGRICULTURAL BUILDING AT THE IOWA STATE
COLLEGE, CONTAINING FORESTRY DEPARTMENT



FORESTRY CLASS AT IOWA STATE COLLEGE MEASURING
A PERMANENT SAMPLE PLOT IN A PLANTATION OF
EUROPEAN LARCH



FORESTRY TRACT OF IOWA STATE COLLEGE.
SCATTERED GROWTH OF NATIVE HARDWOODS
UNDERPLANTED WITH WHITE PINE

addition this subject embraces the topics of state ownership, forest taxation and forest education.

The third or junior year of the course is mainly technical. The first term of lumbering takes up the methods of logging and milling in practice in various parts of the country. Careful attention is given to typical operations. This course is prerequisite to the lumbering trip taken during three weeks of the winter vacation during which the students, with an instructor in charge, make a detailed study of logging and milling in either the Lake States or the South. The students are given an opportunity to observe operations both in the woods and mill and a detailed report of the trip is required before credit is allowed. Forest Mensuration extends throughout the third year. Both courses require one afternoon's field work per week, in addition to class-room lectures. The student becomes familiar with measuring instruments, determines the contents of individual trees by different methods, and collects data for volume and growth tables. The college forestry tract and adjacent woodlands, makes possible some practical work in timber estimating on a limited scale. Forest Surveying extends through the entire school year. The work includes pacing, chaining, ranging; the use of the pocket compass, the surveyor's compass, the hand level, the aneroid barometer, the engineer's level and transit and the plane table.

Special attention is given to approximate instruments such as the pocket compass and the aneroid barometer. Careful attention is also given the taking of topography and the making of topographic maps by various methods ranging from approximate surveys to the more detailed stadia-transit and plane table surveys.

The ever-increasing closer utilization of products of the forest is emphasizing the importance of not neglecting this side of forestry. A lecture and reference course in Forest Utilization takes up in considerable detail the minor industries depending upon the forest, such as the production of naval stores, paper pulp, tannin, maple sugar, and the products of destructive distillation of wood. In connection with this course is considered the various methods of preserving ties, posts and poles with special emphasis on the commercial treating plants. A lecture and laboratory course in Wood Technology familiarizes the student with the more important woods both through careful microscopic examination and by less intensive observations of gross appearance. The department is fortunate in possessing several large collections of hand specimens comprising practically all species of wood found in the United States as well as about 800 specimens from the Philippine Islands, Nicaragua and Argentine Republic. In addition about 100 short log specimens, with bark intact, comprising all the important species, are available for the use of the students in the laboratory. The course in Timber Testing is given in the engineering laboratory where the students are given opportunity of making the various mechanical tests of compression, crossbending, shearing, torsion, etc., with some of the more important commercial timbers.

On many of the western forests the grazing problems are occupying a considerable portion of the forester's time. Under present economic conditions grazing will continue to be closely linked to forestry work, and it is highly desirable that technical foresters be prepared to handle the problems of the range. A course in Range Forage Plants and Ecology is designed to give prospective foresters a working knowledge of the more important grasses, forage and poisonous plants of the open forest as applied to the range. A short field course in Camp Technique gives the students instruction and practice in making camps, packing horses for the trail, handling camp fires, etc.

The work in the senior year is lighter in technical subjects and the student

has an opportunity to elect several hours' work. Forest management is continued throughout the year. During the first semester the subjects of working plans and forest regulation consume the major portion of the time. The second terms' work comprises forest finance, theoretical and applied. Special attention is given to financial adjustments for damages to forest property especially those caused by fire. The course in Forest Administration gives the student instruction in the administrative side of national forest work. The work of protecting forest property is one of the most vital questions confronting the foresters today. The subjects of forest fires, the construction of fire lines, and equipment for fighting fires, are taken up in lecture and reference work in the course in Forest Protection. The subject also embraces a study of the destructive forest insects and means of their control. The work in Mycology and Forest Pathology considers, both in the class room and laboratory, a study of the more important diseases of forest trees.

In addition to the technical training in forestry subjects, the Forestry Course gives the students a good foundation work in allied branches, including the following: Two courses in General Chemistry, Organic Chemistry, Morphology, Vegetable Physiology, Systematic Phanerogams, Plant Embryogeny, Plant Breeding, Pomology, Landscape Gardening, Plant Propagation, Soil Physics, Soil Fertility, Soil Surveying and Mapping, General Entomology, Economic Entomology, General Geology, Physics, and three courses in Engineering. Other subjects included in the course are Mathematics, Veterinary, two courses in Horticulture, two in Farm Crops, two in Animal Husbandry, Bacteriology, Dairying, three courses in English, Economics, History of Political Parties, Journalism and Public Speaking.

During the senior year, candidates for the degree of Bachelor of Science in Forestry must present a thesis. This must represent some original line of investigation which has been approved by the department.

The terms of instruction are so arranged as to permit the students in forestry to spend the three summer months in practical work. In securing temporary employment on national forests or with lumber concerns the students are able to get experience which will prove a valuable asset for future work and subsequent instruction and at the same time allow them to receive as wages sufficient money for defraying the necessary expenses incident to the trip. At the conclusion of the four years' course the students have from six months to one year's practical work behind them. It is the desire of the department to make good in the forestry work the motto of the school, "Science With Practice."



EDITORIAL

THE PRESIDENCY OF THE AMERICAN FORESTRY ASSOCIATION

THE appointment as ambassador to Russia of the Hon. Curtis Guild deprived the American Forestry Association of a president of distinguished public service, who brought to this office enthusiasm and a strong belief in the cause which had developed by official contact during six years of service as lieutenant governor and governor of Massachusetts while that state was shaping a constructive forest policy. The directors of the association found a satisfactory solution of the problem presented by his retirement when they elected Robert Perkins Bass, governor of New Hampshire, to the association's presidency. Governor Bass is no tyro in the field of forestry, for he has worked at its problems on his own property, and he made an admirable record for public service as a member and as president of the New Hampshire Forestry Commission.

Governor Bass has another year to serve as governor of New Hampshire, and as there are many and grave questions of state to be worked out and his first duty is to the state, he can hardly be expected to engage in any very active service for the association during that period, but there can be no doubt that his judgment and his personality will be an active force behind the policies of the governing board from this time as long as he holds the office.

A FOREST SCHOOL FOR LANDOWNERS

THE forest administration of Vermont is showing many examples of practical ideas in state work. One of the most recent is the school of ten days' duration, held at the Downer state forest in August. The state forest service saw that there was provision at numerous institutions for the education of foresters of all grades, but that there was a real need of an opportunity for the landowner, the non-professional, to acquire some of the underlying principles of practical forestry in the limited time which can be spared by busy men.

How little these principles are understood by most woodland owners we all know, and this ignorance is one of the reasons for slow progress in forestry. In our eastern states much depends upon the attitude of the farmers and other small landowners, their intelligent application of the fundamentals of forestry on their own holdings, and their view as citizens of forestry as a question of public economics.

The making of a professional forester is a long educational process, like that of preparing a man for any highly specialized calling; but there are broad principles which every citizen should know, and simple facts important to every owner of woodland, which can be taught by competent teachers in a short period of concentrated work, with the illustrative material at hand. It is this, as we understand it, that the Vermont summer school aims to accomplish. It strengthens its appeal to those whom it wishes to reach by including in its instruction the tree problems of the horticulturist.

This is a good move for the general advancement of forestry ideas. To make them of full service such schools should be largely attended by the

classes for whom they are intended, and on that side it may be said that any owner of woodland would find it well worth while, as a purely business matter, to give the time necessary to attend such a course of instruction. If he has not made himself acquainted with the principles of forestry he can learn much that would have for him a direct money value. If his knowledge has been gained only from reading, personal instruction in the forest land will vitalize that knowledge and make it effective.

It is to be hoped that the Vermont enterprise may be a success and that other state forest services or colleges equipped for instruction in forestry may adopt this excellent idea.

EDUCATION IN FORESTRY

IT IS but a few years since the American who took a serious interest in the science and art of forestry had to study it abroad and on his return to his own country he would find general inability to appreciate, much less to apply to American conditions, the knowledge he had gathered from experienced European foresters. But during those years forestry in America has taken amazing strides in popular appreciation and in practical scientific application. The field of forestry operations in this country is wide and constantly widening, and there has arisen a consequent demand for trained men to cultivate it. A new profession has come into recognition and our educational system has awakened to a new demand upon it.

There are now on file in the office of AMERICAN FORESTRY the announcements of more than twenty different colleges and universities giving complete graduate or undergraduate courses leading to professional degrees in forestry, and numerous others giving some instruction in the general principles of forestry or in certain branches of it. In addition to this the principles of forestry are taught in an elementary way in several secondary schools, and one state has a school to fit rangers for its own forest work.

This indicates a great advance in forestry education and an insistent demand for it. The young man who desires to enter forestry work can find ample opportunity to prepare himself. His choice of an institution will depend upon the educational attainments which he can offer as a basis for professional study, the nature and grade of the work he desires to take up, and convenience of locality.

It is not safe to assume equal quality for all institutions that offer similar courses. Forestry education has not yet been satisfactorily standardized and there is a strong temptation for institutions to go beyond their depth, in order to meet a popular demand, and to offer a full program without sufficient faculty or equipment. A letter recently received by the editor from the head of the forestry department in a university of good standing stated frankly that he did not put any stress upon the professional training given by his department, because he did not regard it as strong enough to fit men for the higher grades of professional work. For that they must go to schools with larger faculties and fuller equipment. This may well apply to other institutions and should be borne in mind by the young man seeking a school in which to study forestry.

In order that the opportunities for such study may be better known, this magazine began in August and continues this month the publication of a series of articles describing the various schools and their work. We believe that these articles will answer many questions that are asked with increasing frequency.

One other observation is pertinent in this connection. In forestry as in other new professions, the first demand is met with an inadequate supply and it is comparatively easy for the first comers to find places. The multiplication of schools and the popularity of the work for young men who love the out of doors is, however, making competition greater, and the time has already come when government or private employers will demand a high standard in the men they take on. The profession is not yet crowded, but it has already reached the point where men must seek places on the basis of thorough knowledge and real ability. To say that one is a forester is not enough. His credentials will be closely examined and he cannot prepare himself too well.

THE THIRD NATIONAL CONSERVATION CONGRESS

THE third National Conservation Congress will meet this year in Kansas City, September 25, 26 and 27. It will be made up as heretofore of delegates from cities, states, and organizations, met for the consideration of topics related to the conservation of the forests, lands, waters, minerals and the vital resources of the nation. The function of this congress, if administered in a broad and liberal spirit, is an important one, deserving thoughtful consideration. The criticism was made of the last congress that too much of its time was given to politics and too little to practical conservation. We trust that this criticism will not be made of the third congress. The able and forceful president of the congress, Henry Wallace, says that there will be no politics in it, and he is a leader whose personal influence will be very real and effective.

The thing that the country wants and expects from such a gathering is helpful guidance along the road to the better and more economical utilization of the natural wealth of the country. There is no real reason why those who still hold to the law of the pioneer should be allowed to occupy the time of a congress met for considering the most serious material problems of a country whose frontier has been pushed into the ocean, and whose resources have been found to have a limit. We want to hear from the foresters, the engineers, the workers in all the fields to which the conservation idea applies. Let them tell us what can be and is being done and how to do it; and let constitutionalists who study the Constitution as a bulwark and protection for the people of the United States, and not for any interest or section, show us the legal and constitutional way.

AMERICAN FORESTRY suggested last year that too many of these great national gatherings have been mere talkfests and that in the future to be effective they must be organized for definite and tangible results, as was the first and most successful of them, the American Forest Congress of 1905. This view we still hold and with greater earnestness as each year our conservation problems become more pressing, concrete and definite. We have confidence that the able men who are directing the third conservation congress take this view and will guide it in the right direction.

NEW HAMPSHIRE'S ANNUAL FORESTRY COUNCIL

THE annual meeting of the Society for the Protection of New Hampshire forests on the second and third of August was, as it has been for some years past, significant of the progress of forestry in New Hampshire and of the spirit of harmony and co-operation which has been a chief element in

bringing about that progress and which the society has been so largely instrumental in securing. The meeting this year was held for the third time at Bretton Woods.

Tuesday afternoon, August 1, there was an excursion from the Crawford House to the summit of Mt. Willard to obtain the incomparable view which Willard affords of the Crawford Notch, which will soon become the property of the state of New Hampshire, a noble scenic and forest reservation of 13,000 acres. Wednesday morning there was an excursion up Mt. Webster into a fine body of primeval spruce on the side of the Notch. A little later a meeting was held of the New Hampshire Timberland Owners' Association, an organization on the lines of the great western protective associations, which is doing valuable co-operative work in fire protection and acts in harmony with the state forestry commission. In the afternoon at the Crawford House there was a meeting of town fire wardens and the district chiefs of the state forestry commission to discuss the practical problems of the state, especially in the field of fire control.

In the evening and on Thursday the meetings were held at the Mt. Pleasant House. The Wednesday evening meeting was addressed by Governor Robert P. Bass, by Hon. W. C. Hawley, a member of the National Forest Reservation Commission, by Henry S. Graves, forester of the United States; by Thomas Nelson Page, acting president of the American Forestry Association, and by W. R. Brown, president of the New Hampshire State Forestry Commission.

The address of Mr. Hawley was of particular interest because he opposed as a member of the House of Representatives and of the Committee on Agriculture the passage of the Weeks bill, and his hearty and evidently sincere expression of belief in the value and success of the law were fully appreciated by his audience. Mr. Hawley predicted the passage of the joint resolution restoring to the purchase fund the \$3,000,000 which has lapsed by expiration of the time limit; and further expressed the belief that the principle of the law would be made a permanent policy of the government at the expiration of the five years of life of the present law.

Thursday morning at the business session the usual routine business of an annual meeting was transacted. The reports showed that the society was in excellent working condition. It has obtained through purchase by popular subscription a tract of 654 acres on Sunapee Mountain, which it is believed will make one of the most attractive mountain forest parks in New England. This was accomplished through the efforts of Herbert Welch, of Philadelphia, a summer resident of the Sunapee country, who gave a spirited talk at this session on the new reservation. George B. Leighton, of the forestry commission, in an able paper proposed a plan for an extensive state forest in the region south of Lake Sunapee. The present officers of the society were re-elected.

J. H. Emerton spoke on "Woodland Spiders," illustrating with numerous specimens from his fine collection; and D. M. Rogers, who has charge of the gypsy and brown-tail moth work in New England of the United States Department of Agriculture, discussed the invasion of New Hampshire by these pests.

In the evening was held a most interesting meeting devoted to New England's state forest problems, with addresses, illustrated with the stereopticon, by A. F. Hawes, state forester of Vermont; E. C. Hirst, state forester of New Hampshire, and P. W. Ayres, forester of the Society for the Protection of New Hampshire Forests.

INSTITUTIONS GIVING INSTRUCTION IN FORESTRY

List by U. S. Forest Service

POST GRADUATE

Yale University, Forest School, New Haven, Conn.:

Two-year post graduate course, degree of Master of Forestry. Two months' summer course at Milford, Pike Co., Pa.

University of Michigan, Forest School, Ann Arbor, Mich.:

Two-year post graduate course; degree of M. S. in Forestry. A six weeks' summer school, at Roscommon.

Harvard University, Forest School, Cambridge, Mass.:

Two-year graduate course.

UNDERGRADUATE

Idyllwild School of Forestry, Riverside Co., Cal.:

Summer school of two months.

Stanford University, Cal.:

A course of lectures in forestry is given annually.

Colorado School of Forestry, Colo. Springs, Colo.:

Four-year course, leading to the degree of *Forest Engineer*. A summer course at Manitou Park, July 15-Sept 15.

University of Chicago, Chicago, Ill.:

A course in forest ecology.

Winona College of Agriculture, Winona Lake, Ind.:

Farm forestry in fall term of senior year.

Berea College, Berea, Ky.:

Fall term, second year, of two-year farmers' academy course.

Harvard University, Forest School, Cambridge, Mass.:

Four-year course in forestry in Lawrence Scientific School; degree of *B. S. in Forestry*.

Eric Forest School, Duxbury, Mass.:

College preparatory course in forestry.

Mount Hermon Boys' School, Mount Hermon, Mass.:

Landscape gardening and forestry, one term.

Berkshire Forest School, Mount Washington, Mass.:

Three-year course.

Smith's Agricultural School and Northampton School of Technology, Northampton, Mass.:

Third year of the four-year agricultural course.

Crookston School of Agriculture, Crookston, Minn.:

Forestry in the third year of the three-year course.

University of Montana, Missoula, Mont.:

The work in forestry includes courses in botany and forestry leading to a degree, and short courses in forestry in January, February, and March.

Cornell University, Ithaca, N. Y.:

Course in forestry established in New York State College of Agriculture, Prof. Walter Mulford, Director.

Hobart College, Geneva, N. Y.:

A course in elementary forestry.

University of Syracuse, Syracuse, N. Y.:

Technical forestry in Junior and Senior years. Professional forester's degree after one year spent in graduate study and field work.

Biltmore Forest School, Biltmore, N. C.:

Course covers one full year, leading to the degree of *Bachelor of Forestry*, and, with two years of practical forest work, the degree of *Forest Engineer*.

(Now a traveling school having working fields during twelve months of each year—in Germany (winter), North Carolina (spring), Tennessee (summer), and Wisconsin (fall).)

*State Forest School, Bottineau, N. Dak.:**Antioch College, Yellow Springs, Ohio:*

Summer School of forestry.

Murray State School of Agriculture, Tishomingo, Okla.:

Three hours a week, fall term, third year of three-year agricultural course.

Pennsylvania State Forest Academy, Mont Alto, Pa.:

Maintained by the Pennsylvania Department of Forestry for the training of young men of the state for work on the state forest reserves. Three-year course. Practical work in the summer months on the Mont Alto Reservation and class work during the winter months.

Middlebury College, Middlebury, Vt.:

The new catalogue of this college shows that students may now have two years of continuous advanced work in forestry.

University of Washington, School of Forestry, Seattle, Wash.:

Four-year course in forestry, leading to degree of *B. S. in Forestry*. Three months' winter course for forest rangers.

Marathon County School of Agriculture and Domestic Economy, Wausau, Wis.:

Double periods of five hours each in third term of first year and in first term of second year.

IN LAND-GRANT COLLEGES

Alabama Polytechnic Institute, Auburn, Ala.:

Senior class of agricultural course—forestry three hours a week and forest laboratory work two hours a week.

Agricultural and Mechanical College for Negroes, Normal, Ala.:

Forestry is taught in the senior year of the four-year agricultural course.

University of Arkansas, Fayetteville, Ark.:

Course of elementary lectures.

University of California, Berkeley, Cal.:

Course of ten lectures by members of the Forest Service during the summer session of the University.

State Agricultural College, Fort Collins, Colo.:

Four-year course in forestry, leading to the degree of *B. S.*

Connecticut Agricultural College, Storrs, Conn.:

In fourth year, in last half of fall term.

Delaware College, Newark, Del.:

In second term of the junior year of the four-year agricultural degree course, and in the second year of the two-year agricultural course.

Georgia State College of Agriculture, University of Georgia, Athens, Ga.:

Four-year course in forestry, leading to degree of *B. S. in Forest Engineering*.

University of Idaho, Moscow, Idaho.:

Four-year collegiate course in forestry.

University of Illinois, Ill.:

Forestry given as electives in undergraduate work in horticulture.

Purdue University, Lafayette, Ind.:

Course in forestry, offered during the last three years of the course in general science.

Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.:

Course in horticulture and forestry, four-year, leading to degree of B. S. A. Work in horticulture and forestry is also offered in the short winter course. Post graduate course.

Kansas State Agricultural College, Manhattan, Kansas:

Four-year course in horticulture and forestry, leading to degree of B. S. Post graduate work.

University of Maine, Orono, Me.:

Four-year course in forestry, leading to degree of B. S., in the College of Agriculture. Post graduate work in forestry, leading to the degree of M. S. Correspondence course in forestry.

Maryland Agricultural College, College Park, Md.:

Five lectures in general forestry in the weekly lecture course in agriculture. Farm forestry is taught in the second year of the two-year agricultural course.

Massachusetts Agricultural College, Amherst, Mass.:

The State Forester gives annually a course of lectures on the general principles of forestry.

Michigan Agricultural College, East Lansing, Mich.:

Four-year course in forestry, leading to the degree of B. S. Also a five-year course open to graduates of the eighth grade. Graduate work, with M. S. degree.

College of Agriculture of the University of Minnesota, St. Anthony Park, Minn.:

Four-year course in forestry leading to the degree of B. S. A four weeks' winter short course, including forestry, is also offered. Graduate work.

Mississippi Agricultural and Mechanical College, Agricultural College, Miss.:

Two years of farm forestry and silviculture.

College of Agriculture, University of Missouri, Columbia, Missouri:

As one of the electives in the undergraduate work in horticulture.

Montana Agricultural College, Bozeman, Mont.:

Four-year course in horticulture and forestry, leading to degrees of B. S. in Horticulture and B. S. in Forestry. Forestry also included in the three-year horticultural course in the School of Agriculture.

University of Nebraska, College of Agriculture, Lincoln, Nebraska:

Four-year technical group in forestry leading to B. S. degree. General forestry is required in the first semester, third year, and is elective in the fourth year of the general agricultural group; also elective in the four-year technical agricultural group. Instruction in forestry is also included in the one-year teachers' course in agriculture for high and normal school teachers.

University of Nevada, Reno, Nev.:

Elective in the four-year agricultural course.

New Hampshire College of Agriculture and Mechanic Arts, Durham, N. H.:

In junior and senior years of full course in agriculture, and in both years of two-year course.

North Carolina Agricultural and Mechanical College, West Raleigh, N. C.:

Senior elective, first term, agricultural course.

State Agricultural and Mechanical College for the Colored Race, Greensboro, N. C.:

Winter term of the senior year of the four-year agricultural course, leading to the B. S. degree.

North Dakota Agricultural College, Agricultural College, North Dakota:

Six-weeks course in forestry in the junior year, third term, of the four-year agricultural course.

College of Agriculture and Domestic Science of the Ohio State University, Columbus, Ohio:

Four-year course in forestry, leading to B. S. degree. Forestry is also offered in the first term of the second year of the two-year course in horticulture.

Oklahoma Agricultural and Mechanical College, Stillwater, Okla.:

Winter term of the senior year of the general science, agricultural, and science and literature courses.

Oregon State Agricultural College, Corvallis, Ore.

Four-year course in forestry leading to B. S. degree. Two-year elementary course in forestry. Six weeks' winter course for forest rangers.

Pennsylvania State College, State College, Pa.:

Four-year course in forestry, leading to B. S. degree. Forestry also an elective subject in the second year of the two-year agricultural course.

Rhode Island College of Agriculture and Mechanic Arts, Kingston, R. I.:

Forestry required in the second term, junior year, agricultural course.

Clemson State Agriculture College of South Carolina, Clemson College, S. C.:

Forestry required in the junior year of the four-year agricultural course, and in the second year of the two-year agricultural course.

South Dakota Agricultural College, Brookings, S. Dak.:

Forestry is required subject in the second semester of the senior year of the animal husbandry group, four-year agriculture course; and in the third year of the three-year school of agriculture. The three-months winter course in horticulture includes the study of forest trees.

University of Tennessee, Knoxville, Tenn.:

Forestry is one of the subjects in the senior year of the four-year agricultural course.

Agricultural and Mechanical College of Texas, College Station, Texas:

Elementary forestry is one of the undergraduate subjects in the senior year of the horticultural group of the four-year agricultural course.

Agricultural College of Utah, Logan, Utah:

The U. S. Forest Service and the Utah College offer conjointly a three-months winter course for forest rangers.

Virginia Agricultural and Mechanical College and Polytechnic Institute, Blacksburg, Va.:

In the third year of the four-year horticultural course.

Hampton Normal and Agricultural Institute, Hampton, Va.:

In second year of the three-year agricultural certificate course.

State College of Washington, Pullman, Wash.:

In second semester of sophomore year of horticultural group of four-year agricultural course. There is also a school of forestry with a two-year course.

West Virginia University, Morgantown, W. Va.:

One of the ungraduate subjects in the College of Agriculture.

University of Wisconsin, Madison, Wis.:

One of the undergraduate subjects in the botanical group in the College of Letters and Science.

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EDUCATIONAL WORK

Course in Agricultural Education

The State Board of Education has authorized a new course at the Iowa State College—a course in Agricultural Education. Its purpose is to train teachers for agricultural and domestic science work in secondary schools. There is a wide and rapidly increasing sentiment in favor of industrial training in the public schools. The demand is far in excess of the supply of teachers. Public school work has not heretofore appealed to the graduates of the agricultural colleges. Recently the demand has become so great that the schools are paying from \$1,000 to \$1,500 for graduates, with assurance of a rapid advance as merited. Other states are paying much larger salaries than Iowa. Out of 855 students enrolled in the Division of Agriculture at Ames during the past year, comparatively few are looking forward to a teaching profession. Of the 78 students graduating from the Division of Agriculture this year not over 10 per cent will become teachers. The establishment of this course is in recognition of the demand upon agricultural colleges for teachers specially trained for the secondary schools. It is recognized that the progress of this work will be measured by the qualifications of the teachers having it in charge. It will probably be many years before the supply of such teachers is equal to the demand.

Prof. A. V. Storm, who has been elected to head the new department, has had an extensive experience in public school work, and his service in the extension department of the college during the past four years has supplemented his school experience in a way that will strengthen him for this work.

University of Nebraska

At a recent meeting of the Board of Regents of the University of Nebraska two changes were made in the faculty of the Forestry Department. The vacancy made by the death of Professor Frank J. Phillips was filled by the promotion of O. L. Sponsler from Adjunct Professor, and W. J. Duppert was appointed Adjunct Professor. Mr. Duppert received both his Bachelor's and his Master's degrees in Forestry from the University of Michigan. His experience

along forestry lines extends over several years in New York, Ohio, and as Forest Assistant on the Coconino National Forest, Arizona.

Chair of Forestry

University of Missouri Will Put in Regular Course in Forestry Under Prof. Ferguson

St. Louis, Mo., July 3.—For the first time in the history of the University of Missouri, at Columbia, Mo., there will be given, this fall, regular courses in forestry, the position of professor of forestry having now been created in connection with the College of Agriculture.

The new department of the university's work will be in charge of Prof. J. A. Ferguson, of State College, Pennsylvania, who has been appointed professor of forestry at the university. Prof. Ferguson is a graduate of the Yale Forestry School and has for nearly two years been the head of the department of forestry at the State College of Pennsylvania. He will begin his work at Missouri University in September.

Fifty thousand acres of forest lands in the southern part of Missouri are owned by the College of Agriculture of the State University, and it is planned to utilize these lands for the instruction of the students in practical forestry.

List of Schools

In the December number of *AMERICAN FORESTRY* we published, for the information of those interested, a list of universities, colleges and institutions where forestry may be studied, giving a statement of the nature and scope of the work done in each case. Necessarily these were very brief, and since then we have been arranging a series of articles dealing more fully with the details of the courses in the various institutions. The first of these articles appeared in the August number. In this issue—the educational number—we are publishing four more of them, and hope to continue with one or more in each successive number.

Fifteen New Men for Missouri College Staff

With an increase of 227 per cent in the total enrollment of students at the Missouri College of Agriculture, it has been found

necessary to enlarge the teaching force of the institution. Fifteen new men have been added to the college and experiment station staff during the summer. This means that every department in the college will have at least one more member than it has had heretofore. The new men appointed are:

J. A. Ferguson, Professor of Forestry, beginning September 1, 1911.

A. J. Meyer, Assistant to the Dean and Superintendent of Short Courses in Agriculture, beginning July 1, 1911.

H. L. Kempster, Assistant Professor of Poultry Husbandry, beginning September 1, 1911.

P. L. Gainey, Instructor in Botany, beginning September 1, 1911.

W. E. J. Edwards, Assistant in Animal Husbandry, beginning September 1, 1911.

E. G. Woodward, Assistant in Dairy Husbandry, beginning September 1, 1911.

E. E. Vanatta, Assistant in Agricultural Chemistry beginning July 1, 1911.

H. G. Lewis, Assistant in Soil Survey, beginning June 1, 1911.

C. A. LeClair, Assistant in Agronomy, beginning September 1, 1911.

W. W. Wobus, Assistant in Dairy Husbandry, beginning July 1, 1911.

Walter E. Camp, Research Assistant in Veterinary Science, beginning June 1, 1911.

J. E. Dunn, Assistant in Soil Survey, beginning June 1, 1911.

E. C. Hall, Assistant in Soil Survey, beginning June 1, 1911.

D. M. Nelson, Assistant in Agricultural Chemistry, beginning August 1, 1911.

P. M. Brandt, Assistant in Dairy Husbandry, beginning September 1, 1911.

The New York State College of Agriculture at Cornell University

Announcement Regarding the Work in Forestry for the Year 1911-1912

The following lines of work will be conducted by the forestry department during the year 1911-1912:

(1) Help for the farmers and other forest owners of the state in the care of their woodlands. This will include instruction in farm forestry and in general silviculture at the university; extension work to reach the people of the state; and field studies of woodlot conditions and needs.

(2) Experimental work relating to the woodlot and general forest problems of the state.

The courses in forestry to be given the present year (silviculture, farm forestry) are not planned for students intending to make forestry a profession, and do not lead to a forestry degree.

The faculty of the department consists of a professor and an assistant professor.

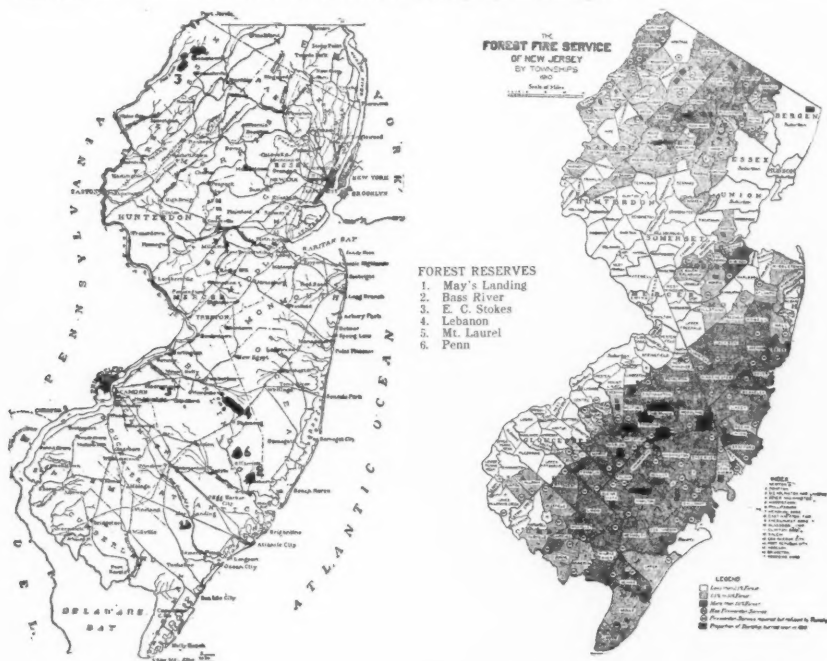
Details regarding the courses in forestry may be obtained from the announcement of the New York State College of Agriculture. Ithaca, New York, August 14, 1911.



STATE FOREST WORK

Forest Fire Legislation in New Jersey

The most significant contribution of the Sixth Annual Report of the Forest Park Reservation Commission of New Jersey is its description of the workings of the law of 1909 for the control of forest fires. The accompanying maps show the state forest reserves and the forest fire service of New Jersey by townships:



As means to control or lessen the number of forest fires, the "Act for the Protection of Woodlands," Chapter 74, Laws of 1909, has proved of great value. The fire service is to be credited with a considerable part of this improvement for the firewardens are especially active along the railroads, yet it may safely be said that the making of fire lines as required by Chapter 74, Laws of 1909, has altogether changed the situation. True these lines now cover only one-fifth of the exposure in the State, but, with the co-operation of the management of the various roads, the first year's cutting was done at the most exposed points. The effect has been immediate and positive and proves the value of the Act as a means of reducing the danger to the forests from railroad locomotives.

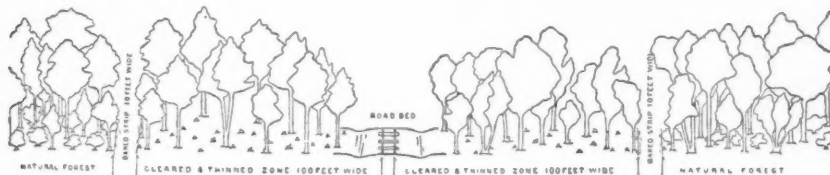


FIG. III.—DIAGRAM OF RAILROAD FIRE LINE CONSTRUCTED ON LEVEL GROUND ACCORDING TO CHAPTER 74, LAWS OF 1909.

NATIONAL FOREST WORK

Aeroplanes to Protect Forests

Maj. Frank A. Fenn, supervisor of the Selway forest, embracing 1,600,000 acres formerly part of the Nez Perce reserve in north central Idaho, predicts that the time is not far distant when aeroplanes and wireless telegraphy will be important factors in protecting timbered land in the Pacific slope country. He thinks a man in a flying machine could do more accurate and extensive survey work in the mountains in a few hours than is usually accomplished by a force of twenty rangers in a week when forest fires are raging, and with wireless stations installed on peaks in the chief danger points it would be a comparatively easy task to assemble men and apparatus to check and extinguish the flames and prevent spreading. Major Fenn, who is stationed at Kooskia, has completed preparation to handle fire outbreaks and has forty men patrolling the reserve, in addition to which are twenty men stringing telephone lines and building trails and wagon roads. Charles Fisher, with headquarters at Orofino, has charge of the Clearwater reserve, also formerly part of the Nez Perce forest. One hundred and twenty miles of telephone lines are in operation through the mountains from Kooskia to Powell station on the Licksaw via the Selway and Graves creek, and it is planned to extend the line this year through the Lolo pass to Lolo Hot Springs, Montana, 60 miles from Powell station.

First Purchase for Appalachian Forest

Nashville lumbermen are first to score in selling land to the government for the establishment of the Appalachian National Forest. Our issue of last week contained a brief notice of the approval by the commission of the purchase of a tract of some 32,000 acres in Fannin, Union, Gilmer and Lumpkin counties, lying along the headwaters of the Toccoa River, an important tributary of the Tennessee.

The tract embraces the entire holding in that neighborhood of Messrs. Andrew and N. H. Gennett, both natives of Nashville, who started in the lumber business here, and later removed to Fort Madison, S. C., where they successfully operated a big band mill for several years. Selling this plant with its important timber holdings to a prominent Baltimore operator, the Messrs. Gennett invested heavily in timberlands in both the Carolinas and in north Georgia.

They have sold some very large tracts recently to be operated by lumbermen.

Having a thorough personal knowledge of the entire Southern Appalachian field, and having made a study of what the Forest Service at Washington is attempting to do in the establishment of a national forest in the Appalachian region, the Messrs. Gennett were in position to go before the commission with a definite and specific offer of a large area admirably located and upon which a thorough cruise of the timber had been made.

It is announced that the trade will be consummated as soon as titles to the property can be approved by the government. The deal involves \$207,821, the government commission having reported the value of the forest products on the tract to be \$152,911.10, and the value of the land \$54,909.75. It appears that the tract is pretty good hardwood timber, cutting something like 3,500 feet to the acre. The following is the government cruise of the timber, in addition to which there are 2,585 cords of hemlock bark and 7,671 cords of chestnut bark:

White Oak.....	16,291,044
Red Oak.....	18,761,996
Chestnut Oak.....	7,585,248
Chestnut.....	38,213,560
Poplar.....	7,958,764
Hemlock.....	3,620,232
White Pine.....	833,228
Locust.....	632,104
Miscellaneous.....	4,453,460

Total..... 98,349,636

In commenting upon the value of this tract, the report of the Forest Service to the commission empowered to buy says:

"The only thing lacking at the present time to render this tract highly desirable from a lumber operator's standpoint is railroad transportation. There has for years been talk of a railroad between Mineral Bluff and Gainesville, Ga., a distance of 52 miles in an air line. This route has already been surveyed running up Rock Creek, in the southern division of the Gennett tract, and crossing the main summit of the Blue Ridge Mountains at High Tower Gap. This road, if constructed, would tap the largest section of Georgia which is now without railroad transportation. All of this tract would be lumbered economically after the construction of such a railroad. On account of the great natural resources of this region, the construction of

a railroad will inevitably come about in the course of time. At the present time the prospects of construction are indefinite. This fact is chiefly responsible for the comparatively low value of these lands."

This raises the question as to what will be the effect generally upon railroad extension in the Southern Appalachian of the establishment of this national forest. In a very few years, beyond a doubt, all the timber in that region as good as the Genett tract would pass into the hands of operating lumbermen, and as an incident to these operations a considerable railroad development would occur. A number of spurs and extensions would be built by lines penetrating that region, and in addition many logging roads would be constructed which ultimately would develop into common carriers. How much this railroad development will be retarded by the passing

of a big area of the timber into the hands of the government remains to be seen. It is not the purpose of the government, as we understand it, where it acquires land having timber good enough for sawmill operations, to withhold the timber from manufacture, but to offer the utmost encouragement to lumbermen to come in and buy and cut it under such regulations as will perpetrate a regrowth, while protecting the area from destructive erosion.

The editor of *The Southern Lumberman* is familiar with much of the tract embraced in the present purchase. It is in a region where, when the timber has been cut off, the erosion is frightful, and is in the heart of a section where, if this erosion can be prevented throughout a wide territory, the effect on a number of important southern streams will be very great.—*The Southern Lumberman*, 1, July, 1911.

NEWS AND NOTES

Uncle Sam Owns Much Timber but Has Only One Saw Mill

Wausau, Wis., June 27.—According to official reports, Uncle Sam owns some six hundred billion feet of standing timber scattered over a wide territory in the United States. However, at only one place has he attempted to convert stumpage into lumber on a commercial scale. This is at Neopit, Wis., where a government-built and operated sawmill is cutting lumber from the timber on the Menominee Indian Reservation, on the theory that more profit can thus be made for the Indians than by selling stumpage for some one else to manufacture. It is an up-to-date, modern plant, with two band and a resaw, besides shingle and lath mills. It was built three years ago under the direction of E. A. Braniff, of the United States Forest Service, and the entire plant represents an investment of more than \$300,000. The mill is turning out 250,000 feet of lumber every twenty-four hours, and it is expected that the annual cut from now on will be 40,000,000 feet. With 2,000,000,000 feet of standing timber on the reservation to draw upon, the plant has a long future before it, regardless of any second crop of timber which may be obtained through scientific management of the cut-over land. It is estimated that approximately 40 per cent of the stand is hemlock and the remainder exceptionally good white pine and hardwoods. The cut this year is chiefly white pine, and some very high class timber is being manufactured, as will be seen by the illustrations. One contract calls for 1,000,000 feet of waney-edged pine to be shipped to England, for which \$50 per thousand is paid at the mill.

In addition to being the only government

sawmill in the United States, this plant has the unique distinction of having a woman for its sales manager—Miss E. S. Gallet—and she is generally acknowledged to be well fitted for the task. Uncle Sam has experienced various kinds of trouble with his sawmill, including some unpleasant notoriety during the Ballinger-Pinchot investigation, but he takes no chances with slow collections, and in this respect is decidedly ahead of the ordinary lumber manufacturer. The lumber at Neopit is advertised and sold to the highest responsible bidder, and it is paid for in cash without discount when loaded on the cars ready for shipment. An exact and complete cost-keeping system installed by the general superintendent and Indian agent, A. S. Nicholson, indicates that the operation is making a small margin of profit above present stumpage prices, after allowing for depreciation, interest on the investment, and overhead charges of every kind.

The Menominee Indians number some 1,100, and on an average about 200 of the men are employed in the woods, on the river, and around the mill. The Indians are exceptionally good river men, but will not have so much opportunity for work of this character as was anticipated. The original plan was to drive all timber to the mill, but this has been abandoned, and the logs will hereafter be brought in by railroad. Seven miles of logging road is now built, and the system will be gradually extended to reach all the timber on the reservation. After cutting, part of the reservation will be cleared and allotted to the Indians for farms, while the remainder will be held for another crop of timber, the cutting on this section now being restricted to timber marked according to forestry methods.

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